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Chapter 6

Professor Tim Busken

Grossmont College Mathematics Department

June 8, 2013

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Table A-2 (the z-table) click here to access the classroom worksheet 2



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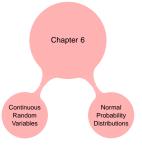
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The main focus of Chapter 6 is two-fold!

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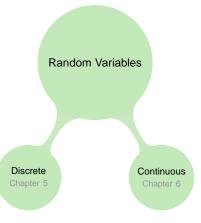
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Continuous random variables (CRVs) can take on numerical values that fall in an interval where there are no gaps between the numbers.

Examples of CRVs: distance, speed, time, shelf life of foods and medicines, heights and weights, volumes, surface areas.



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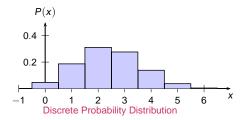
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Unlike discrete random variables, CRVs take on an infinite number of values in an interval. If you try to assign a probability to each of the infinite values in the interval, the sum of the probabilities is no longer 1 (or 100%)!

So, we must take a different approach.



Continuous Probability Distribution

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An example of a discrete probability distribution (left figure) and a continuous probability distribution (right) are shown above. Remember that not all probability distributions are bell-shaped!

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Probability Density Function (PDF)

Suppose you have a set of measurements on a continuous random variable and you create a relative frequency histogram to describe their distribution. For a small number of measurements, you could use a small number of classes; then as more and more measurements are collected, you can use more classes, and reduce the class width.

The outline of the histogram will change slightly, for the most part becoming less and less irregular, as shown in the animation (right).

As the number of measurements becomes large and the class widths become more narrow, the relative frequency histogram appears more and more like a smooth, continuous curve.

This smooth curve describes the probability distribution of the continuous random variable, and is called a probability density function.

Not all PDFs are bell-shaped!

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Concept

 \checkmark If we take an infinite number of measurements and shrink the class width to near zero, then the histogram outline takes on the shape of a smooth curve. We can show mathematically that the area under the smooth, PDF curve is 1—resulting in a correspondence between area and probability.

As class widths decrease, more rectangles are required to construct the probability histogram. Additionally, once the class widths shrink to zero, there are an infinite number of rectangles under the curve, so every real number in the interval becomes a distinct class. As a result of this construction, for any particular value of *x*, such as x = a,

P(x=a)=0.

That is, the probability associated with any single value of x is zero. This is a major difference between continuous random variables and discrete random variables. Therefore, for continuous random variables, we can only determine the probability that x will be between two values.

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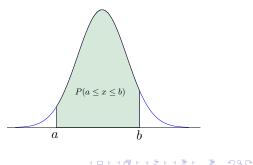
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How to Find Probabilities for Continuous Random Variables

- First identify the correct probability density function (PDF) that is associated with the continuous random variable, *x*.
- 2 The probability that a continuous random variable x assumes a value in the interval from a to b is the area under the PDF between vertical lines x = a and x = b.



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Properties of PDFs

Definition

A probability density function (PDF)

is the graph of a continuous probability distribution. It must satisfy the following properties:

- The total area under the curve must equal 1.
- 2 Every point on the curve must have a vertical height that is 0 or greater. (That is, the curve cannot fall below the x-axis.)

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A continuous random variable, x has a uniform distribution if its values are spread evenly over the range of probabilities. The graph of a uniform distribution results in a rectangular shape.

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Example: Wait times at the bus stop are uniformly distributed between 0 and 15 minutes.

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Example: Wait times at the bus stop are uniformly distributed between 0 and 15 minutes. This means that any wait time between 0 minutes and 15 minutes is possible and all of the possible wait times are equally likely.

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Uniform Distribution

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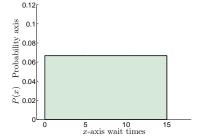
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Example: Wait times at the bus stop are uniformly distributed between 0 and 15 minutes. This means that any wait time between 0 minutes and 15 minutes is possible and all of the possible wait times are equally likely.

If we randomly select one of the wait times and represent its value by the random variable, *x*, then *x* has a probability distribution described by the 1st quadrant rectangular graph above: the area under probability density function (PDF), $f(x) = \frac{1}{15}$, bounded by vertical lines x = 0 and x = 15.

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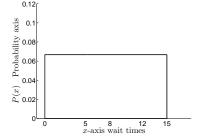
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Example: Wait times at the bus stop are uniformly distributed between 0 and 15 minutes. Determine the probability that a randomly selected wait time is between 8 and 12 minutes.

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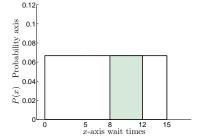
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Example: Wait times at the bus stop are uniformly distributed between 0 and 15 minutes. Determine the probability that a randomly selected wait time is between 8 and 12 minutes.

Solution: Compute the area under the uniform PDF from 8 to 12 minutes:

$$P(8 < x < 12) = \text{base} \cdot \text{height} = (12 - 8) \cdot \frac{1}{15} \doteq 0.2667$$

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Click this text to try a similar exercise.

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The Normal Probability Distribution

Definition

If a continuous random variable has a probability distribution with a graph that is symmetric and bell-shaped, and it can be described by the function equation

$$f(\mathbf{x}) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{\mathbf{x}-\mu}{\sigma}\right)^2} \qquad -\infty \le \mathbf{x} \le \infty$$

then we say it has a normal distribution.

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then we say it has a normal distribution.

Note that $\pi \doteq 3.1416$ and $e \doteq 2.7183$ in the formula. When the parameters μ and σ are fixed constant, the above equation becomes a function of a single variable x; and a particular normal distribution is determined.

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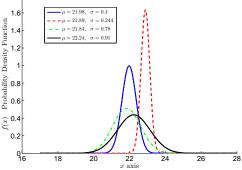
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Note that $\pi \doteq 3.1416$ and $e \doteq 2.7183$ in the formula. When the parameters μ and σ are fixed constant, the above equation becomes a function of a single variable x; and a particular normal distribution is determined.

The figure (right) shows four different normal probability curves determined by different values of these parameters. We show in another class that the area underneath each of these curves, between the x axis and f(x), is 1.



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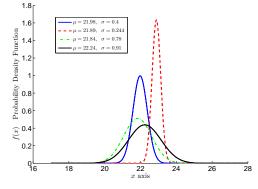
$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2} \qquad -\infty \le x \le \infty$$

then we say it has a normal distribution.

The mean, $x = \mu$, locates the center of the distribution. The vertical line, $x = \mu$ is an axis of symmetry for the PDF.

The population standard deviation, σ , affects the shape of the distribution.

Large values of σ decrease the height of the peak and increase the spread of the distribution (along the *x* axis; small values of σ raise the height of the peak and decrease the spread.



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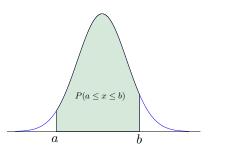
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The probability that a continuous random variable *x* assumes a value in the interval from *a* to *b* is the area under the probability density function between vertical lines x = a and x = b.



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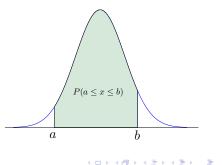
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- The probability that a continuous random variable *x* assumes a value in the interval from *a* to *b* is the area under the probability density function between vertical lines x = a and x = b.
- Since normal curves have different population means and standard deviations, there are infinitely many large number of normal distributions.



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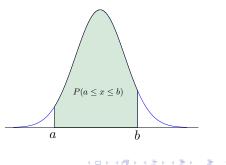
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Tabulated Areas of the Normal Probability Distribution

- The probability that a continuous random variable *x* assumes a value in the interval from *a* to *b* is the area under the probability density function between vertical lines x = a and x = b.
- Since normal curves have different population means and standard deviations, there are infinitely many large number of normal distributions.
- D A separate table listing the areas for *each* of these curves is obviously impractical.



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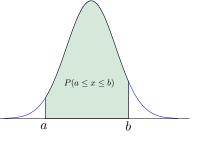
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Tabulated Areas of the Normal Probability Distribution

- The probability that a continuous random variable *x* assumes a value in the interval from *a* to *b* is the area under the probability density function between vertical lines x = a and x = b.
- Image: Since normal curves have different population means and standard deviations, there are infinitely many large number of normal distributions.
- D A separate table listing the areas for each of these curves is obviously impractical.
- Instead, we use a standardization procedure that allows us to use the same table for all normal distributions.



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Converting to the Standard Normal Distribution

Definition

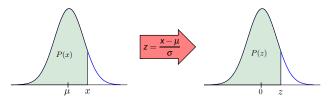
A normal random variable *x* is *standardized* by expressing its value as the number of standard deviations (σ) it lies to the left or right of its mean μ . The standardized normal random variable, *z*, is defined as $z = \frac{x - \mu}{\sigma}$

or equivalently,

$$x = \mu + zc$$

From the formula for z, we can draw the following conclusions.

- \checkmark When x is less than the mean μ , the value of z is negative.
- \checkmark When x is greater than the mean μ , the value of z is positive.
- \checkmark When $x = \mu$, the value of z = 0



The probability distribution for *z* is shown in the figure (right) is called the standard normal distribution because its mean is 0 and its standard deviation is 1.

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Tabulated Areas of the Normal Probability Distribution

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It is standardization process helps us convert normal distributions whose mean is not 0 or whose standard deviation is not 1 to the standard normal distribution.

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It is standardization process helps us convert normal distributions whose mean is not 0 or whose standard deviation is not 1 to the standard normal distribution.

We do this (because it works and) so that we may use the same table of probabilities when working with any normal distribution.

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Tabulated Areas of the Normal Probability Distribution

It is standardization process helps us convert normal distributions whose mean is not 0 or whose standard deviation is not 1 to the standard normal distribution.

We do this (because it works and) so that we may use the same table of probabilities when working with any normal distribution.

That table of probabilities is Table A2 in the back of your textbook. (click here to view a copy)

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Using Table A-2

It is designed only for the standard normal distribution, which has a mean of 0 and a standard deviation of 1.

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and						2				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.001-
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	.0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.277
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.424
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area. *Use these common values that result from interpolation:

z score Area

-1.645 0.0500 -2.575 0.0050 🔫



Using Table A-2

- It is designed only for the standard normal distribution, which has a mean of 0 and a standard deviation of 1.
- D Table A-2 is on two pages, with one page for negative z-scores and the other page for positive z-scores.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	,1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	,4404	.4364	.4325	.4286	.4245
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3.49, use 0.0001 for the area. *Use these common values that result from interpolation:

Area z score -1645 0.0500

-2.575 0.0050 ◄

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Using Table A-2

- It is designed only for the standard D normal distribution, which has a mean of 0 and a standard deviation of 1.
- D Table A-2 is on two pages, with one page for negative z-scores and the other page for positive z-scores.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	,0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	,0008	,0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	,0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0034
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006-
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	,036
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	,0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	,1112	.1093	.1075	.1056	,1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	,1814	,1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	,4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4243
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	464

NOTE: For values of z below -3.49, use 0.0001 for the area. *Use these common values that result from interpolation:

1.00

Area z score -1645 0.0500

-2.575 0.0050



POSITIVE *z* Scores

Using Table A-2

- It is designed only for the standard normal distribution, which has a mean of 0 and a standard deviation of 1.
- Table A-2 is on two pages, with one page for negative z-scores and the other page for positive z-scores.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	,9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.9999					1 Protection				
and up										
NOTE: F	or values of	z above 3	.49, use 0.9	1999 for the	area.				Common (Critical V
	se commor					1			Confidenc	e Critic
z scor						1			Level	Valu
1.645		-							0.90	1.64
2.575									0.95	1.96

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Using Table A-2

There are two pieces of info on this table: *z*-scores and probabilities.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.001
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.001
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.001
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.014
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.018
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	.0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.186
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.214
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.277
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.312
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.424
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3,49, use 0.0001 for the area. "Use these common values that result from interpolation:

-

z score Area -1.645 0.0500

-2.575 0.0050 -

Using Table A-2

There are two pieces of info on this table: z-scores and probabilities.

The leftmost column r 🖸

	N									
Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50						2				
and						-				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	8000.	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0034
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-21	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	• .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	,1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	,4443	,4404	.4364	.4325	.4286	.4243
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area. *Use these common values that result from interpolation:

Area -

Z SCORE -1.645 0.0500

-2.575 0.0050 🔫

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Using Table A-2

- There are two pieces of info on this table: *z*-scores and probabilities.
- The leftmost column and the top row are associated with *z* values.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50	1000000000		-	an in the			-	CONTRACT OF		11.25
and						-				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	8000.	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4245
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3.49, use 0.0001 for the area. "Use these common values that result from interpolation:

z score Area

-1.645 0.0500

-2.575 0.0050 🔫



Using Table A-2

- There are two pieces of info on this table: *z*-scores and probabilities.
- The leftmost column and the top row are associated with *z* values.
- Each value in the "body" of the table is a cumulative area from the left up to a vertical boundary above a specific z-score.

Ζ	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50	-									-
and	/					-				
ower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	0014	.0014
2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.01-1	0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	0028	.027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	. 038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	005	0051	* .0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	06.	0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.005	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125		.01	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	. 529	.0322	.0314	.0307	.0301	.0294
1.7	.0446	.0436	.0427	.0418	.0 .9	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	510	1505	• .0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0. 0	0018	.0606	.0594	.0582	.0571	.0559
1.4	.0808	.0793	.077	76	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	34	1	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	10.3	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.1	.4602	.4562	.4522	.4483	.4443	,4404	.4364	.4325	.4286	.4247
-0.0	5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
	or values of									~

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-1.645 0.0500

-2.575 0.0050



Using Table A-2

- D There are two pieces of info on this table: z-scores and probabilities.
- The leftmost column and the top row DD. are associated with z values.
- Each value in the "body" of the table is a cumulative area from the left up to a vertical boundary above a specific z-score. These area values are mathematically equivalent to probabilities.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50	1					2				~
and	/					-				
ower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0022	00	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	00	.0001	* .0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	. 069		A .0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	001	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.019	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	158	0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.002	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.026	02.	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	0729	0.522	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.040	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	050	* .0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	OF 10	.0018	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	07	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	034	918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	12	.10.33	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.13	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1655	.1867
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1007
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2546	.2200	.2483	.2451
-0.6	.2743	.2709	.2676	.2643		.2578	.2877	.2843	.2483	.2431
-0.5	.3085	.3050	.3015	.2981	.2946	.3264	.3228	.2843	.3156	.3121
-0.4	.3446	.3409	.3372	.3336	.3300		.3594	.3192	.3520	.3483
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3974	.3936	.3897	.3463
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.4364	.4325	.4286	.4247
-0.1	.4602	.4562	.4522						.4681	.4641
-0.0	5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4081	.4041
	or values of					1				~

-2.575 0.0050



Using Table A-2

- D There are two pieces of info on this table: z-scores and probabilities.
- DD. The leftmost column and the top row are associated with z values.
- Each value in the "body" of the table is a cumulative area from the left up to a vertical boundary above a specific z-score. These area values are mathematically equivalent to probabilities.
- The part of the z-score denoting D hundredths is found across the top.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50	100000000000000000000000000000000000000						6.1794.52 (J.)			
and						-				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.001
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.001-
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.001
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516		* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630		.0606	.0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.277
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.424
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area *Use these common values that result from interpolation



-2.575 0.0050

> () > () > () > () ъ.

Chapter 6

Tim Busken

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Example: The Precision Scientific Instrument Company manufactures thermometers that are supposed to give readings of 0°C at the freezing point of water. Tests on a large sample of these instruments reveal that at the freezing point of water, some thermometers give readings below 0°C (denoted by negative numbers) and some give readings above 0°C (denoted by positive numbers). [2]

Assume that the mean reading is 0° C and the standard deviation of the readings is 1.00°C. Also, assume that the readings are normally distributed. If one thermometer is randomly selected, find the probability that, at the freezing point of water, the reading is less than -1.51°C.

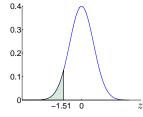
<u>Solution</u>: We are told the distribution is normal, with $\mu = 0$ and $\sigma = 1$. Let x be the continuous random variable representing the temperature of a randomly selected thermometer.

We need to find the probability that *x* is less than -1.51°C, or, symbolically, $P(x < -1.51^{\circ})$. Then,

$$P(x < -1.51^\circ) = P\left(z < \frac{x-\mu}{\sigma}\right)$$
 (standardize x
i.e., transform x -

$$= P\left(z < \frac{-1.51 - 0}{1}\right) \quad \text{since } x = -1.5^{\circ} \\ \mu = 0 \text{ and } \sigma =$$

$$= P(z < -1.51)$$



NEGATIVE *z* Scores



L	z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
33	-3.50						2				
	and						-				
	lower	.0001									
	-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
	-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
)	-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
	-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
	-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
	-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
Г	-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
	-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
	-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
12	-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
	-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.0064
	-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
	-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
15	-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
	-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
18	-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
	-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
	-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
	-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.0455
	-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	,0594	.0582	.0571	.0559
	-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
	-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
	-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
	-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
	-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	,1401	.1379
	-0.9	.1841	,1814	,1788	.1762	.1736	.1711	.1685	,1660	.1635	.1611
	-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
	-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
Г	-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
	-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
Г	-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
	-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
r	-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
h	-0.1	.4602	.4562	.4522	.4483	,4443	.4404	.4364	.4325	.4286	.4247
	-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3,49, use 0.0001 for the area. "Use these common values that result from interpolation:

z score Area

-1.645 0.0500

-2.575 0.0050 🔫

<u>Solution</u>: We are told the distribution is normal, with $\mu = 0$ and $\sigma = 1$. Let x be the continuous random variable representing the temperature of a randomly selected thermometer.

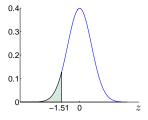
We need to find the probability that x is less than -1.51°C, or, symbolically, $P(x < -1.51^\circ)$. Then,

$$P(x < -1.51^{\circ}) = P\left(z < \frac{x - \mu}{\sigma}\right) \quad (\text{standardize } x \\ i.e., \text{ transform } x \rightarrow 0$$

$$= P\left(z < \frac{-1.51 - 0}{1}\right) \quad \text{since } x = -1.51 - 0$$

$$\mu = 0 \text{ and } \sigma = 0$$

$$= P(z < -1.51)$$



This last probability is equal to the area under the Standard Normal Distribution just left of z = -1.51. We can find this value from Table A-2.

NEGATIVE *z* Scores



L	Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
	-3.50										
	and						3				
	lower	.0001									
Г	-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
)	-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
)	-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
	-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
Г	-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
	-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
Г	-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
	-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
Г	-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
	-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
Г	-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.0064
	-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008-
Г	-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
	-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
Г	-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
	-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
Г	-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
	-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
Г	-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.0455
	-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	.0594	.0582	.0571	.0559
Г	-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
	-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
Г	-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
	-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
Г	-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
	-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	,1660	.1635	.1611
	-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
Ŀ	-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
ſ	-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
1	-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
ſ	-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
ł	-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
ſ	-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
h	-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4245
Г	-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3.49, use 0.0001 for the area.

*Use these common values that result from interpolation:



-2.575 0.0050 -

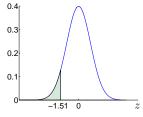
Solution: We are told the distribution is normal, with $\mu = 0$ and $\sigma = 1$. Let x be the continuous random variable representing the temperature of a randomly selected thermometer.

We need to find the probability that x is less than -1.51° C or, symbolically, $P(x < -1.51^{\circ})$. Then,

$$P(x < -1.51^{\circ}) = P\left(z < \frac{x - \mu}{\sigma}\right) \quad \text{(standardize } x \\ i.e., \text{ transform } x \rightarrow 0$$

$$= P\left(z < \frac{-1.51 - 0}{1}\right) \quad \text{since } x = -1.5 \\ \mu = 0 \text{ and } \sigma =$$

$$= P(z < -1.51)$$







	Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
	-3.50										
	and						-				
	lower	.0001									
	-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
	-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
)	-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
	-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
	-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
	-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
	-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
	-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
	-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
	-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
	-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.0064
	-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
	-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
	-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
	-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
	-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
	-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
	-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1	-16	0548	0537	0526	0516	0505	0.495 0.495	0485	.0475	.0465	.0455
ĺ	-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1	L4	.0808	.0793	.0770	.0704	.0745	.0133	.0721	.0100	.0004	10001
	-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
	-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
	-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
	-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
	-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	,1660	.1635	
	-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
	-0.7	.2420	.2389	.2358	.2327	.2296	.2266			.2177	
		.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
	-0.6			.3015	.2981	.2946	.2912	.2877	.2843		
	-0.5	.3085	.3050								
	-0.5 -0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
	-0.5 -0.4 -0.3	.3446	.3409 .3783	.3372 .3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
	-0.5 -0.4 -0.3 -0.2	.3446 .3821 .4207	.3409 .3783 .4168	.3372 .3745 .4129	.3707 .4090	.3669 .4052	.3632 .4013	.3594 .3974	.3557 .3936	.3520 .3897	.3483 .3859
	-0.5 -0.4 -0.3	.3446	.3409 .3783	.3372 .3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483

NOTE: For values of z below -3.49, use 0.0001 for the area. *Use these common values that result from interpolation:

-2.575 0.0050 ◄

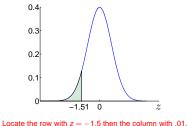
<u>Solution</u>: We are told the distribution is normal, with $\mu = 0$ and $\sigma = 1$. Let x be the continuous random variable representing the temperature of a randomly selected thermometer.

We need to find the probability that *x* is less than -1.51°C, or, symbolically, $P(x < -1.51^{\circ})$. Then,

$$P(x < -1.51^{\circ}) = P\left(z < \frac{x - \mu}{\sigma}\right) \quad \text{(standardize } x \\ i.e., \text{ transform } x \rightarrow z \\ (z - 1.51 - 0) \quad \text{since } x = -1.6$$

$$= P\left(z < \frac{1}{1}\right) \quad \mu = 0 \text{ and } \sigma$$

$$= P(z < -1.51)$$



The intersection of this row and column gives the

cumulative probability, 0.0655

NEGATIVE z Scores



	z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
				a contraction of							
	-3.50						2				
	and lower	.0001									
	-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
	-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
)	-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
1	-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
	-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
	-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
.	-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
1	-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
	-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
	-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
	-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006-
	-2.3	.0107	.0104	,0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
	-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
	-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
	-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
	-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
	-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
	-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
	-16	0548	0537	0526	0516		* 0495	0485	0475	.0465	.0455
í	-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
٩	-1.4	.0808	.0793	.0770	.0704	.0740	.0755	.0721	.0700	.0004	.0001
	-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
	-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
	-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
	-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
	-0.9	.1841	.1814	1788	.1762	.1736	.1711	.1685	,1660	.1635	.1611
	-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
	-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
	-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
	-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
	-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
	-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
				.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
	-0.2	.4207	.4168	,412.0							
	-0.2	.4207	.4168	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247

NOTE: For values of z below -3.49, use 0.0001 for the area.

*Use these common values that result from interpolation:

Z SCOTE Area

-1.645 0.0500

Chapter 6

Tim Busken

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Chapter 6

Continuous Random Variables

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Examples

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Other Sampling Distributions

Unbiased and Biased Estimators

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Another Random Experiment

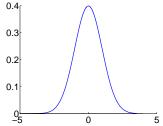
Works Cited

click here to access the classroom worksheet

click here to access Table A-2 (the z-table)

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The negative z table lists cumulative areas from the left of the center (z = 0). Notice that as the values of z increase from -3.5 to 0, so does the cumulative areas (probabilities).



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50	Sector Street									
and						3				
ower	.0001									
-3.4	0003	0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
0.0	.0007	.0007	.0000	.0000	.0000	.0000	.0000	0005	0005	0001
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	,1814	,1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3.49, use 0.0001 for the area *Use these common values that result from intercolation:

Area z score

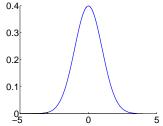
-1645 0.0500

-2.575 0.0050

100

(日) (四) (日) (日) (日)

The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-71	0010	0009	0009	0009	0008	0008	0008	8000	0007	000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	10018	.0018	20017	.0010	.0010	.0010	.0015	.0014	.001
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4243
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

(I) (A) (A) (A) (A)

NOTE: For values of z below -3,49, use 0.0001 for the area. "Use these common values that result from interpolation:

100

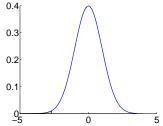


-1.645 0.0500

-2.575 0.0050

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The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
ower	,0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
2.0	0026	0025	0024	0007	0027	0022	0021	0021	0020	0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0045	.0041	.0040	.0039	.0058	.0037	.0031
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	,1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4245
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3.49, use 0.0001 for the area. "Use these common values that result from interpolation:

100

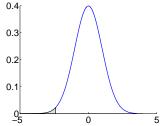


-1.645 0.0500

-2.575 0.0050

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The negative z table lists cumulative areas from the left of the center (z = 0). Notice that as the values of z increase from -3.5 to 0, so does the cumulative areas (probabilities).



Ζ	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
ower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
0.0	0052	0000	0050	0.057	OOFF	0054	0052	0051	8 0049	004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.5	.0107	.0104	.0102	100.98	.0096	.0094	.0091	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516		* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2770
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4243
-0.0	.5000	.4960	.4920	.4880	.4840	,4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area. *Use these common values that result from interpolation:



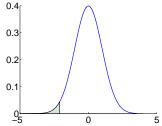
-1645

-2.575 0.0050

100

(I) (A) (A) (A) (A)

The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008-
22	0170	0176	0132	0129	0125	0122	0119	0116	0113	0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	10212	.0207	.0202	.0197	.0152	.0100	.0105
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516		• .0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630		.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4245

NOTE: For values of z below -3,49, use 0.0001 for the area "Use these common values that result from interpolation:

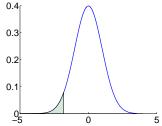
100

z score _____Area

-1.645 0.0500

-2.575 0.0050

The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50					-					
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
10	0397	0291	0274	0269	0262	0256	0250	0244	0239	0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-67	.0446	.0430	.0427	.0410	.0409	.0401	.0392	.0304	.0070	.050.
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4245
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

NOTE: For values of z below -3.49, use 0.0001 for the area. "Use these common values that result from intercolation:

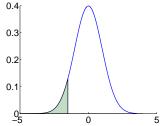
100

z score Area

-1.645 0.0500

-2.575 0.0050

The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
ower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	,0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0034
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.0	0548	0577	0526	0516	0505	0.495	0485	0475	0465	045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	8080.	.0793	.0778	.0764	.0749	.0755	.0721	.0708	.0694	.000
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	,1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	,4404	.4364	.4325	.4286	.4243
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3,49, use 0.0001 for the area "Use these common values that result from intercolation:

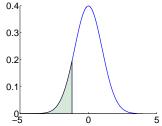
z score Area

-1.645 0.0500

-2.575 0.0050

0.0050 ◄

The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						2				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	,0008	,0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	,0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0034
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-17	0.068	0951	0934	0918	0901	0885	0869	0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	1007	.1555	.1514	.1252	.1492	.1469	.1446	.1423	.1401	.1379
-1.0	.1587	.1562	,1539	.1515	.1492	.1409	.1685	.1660	.1635	.1611
-0.9	.1841	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.8	.2119	.2090	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2420	.2369	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.2743	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.5	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.4	.3446	.3783	.33745	.3330	.3669	.3632	.3594	.3152	.3520	.348
-0.3	.4207	,4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.2	.4207	.4166	.412.9	.4483	.4032	,4404	.4364	.4325	.4286	.424
-0.1	.4602	.4562	.4522	.4465	.4840	,4801	.4364	.4325	.4681	.464

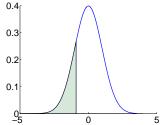
NOTE: For values of z below -3.49, use 0.0001 for the area. "Use these common values that result from intercolation:

100



- -1.645 0.0500
- -2.575 0.0050

The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Ζ	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0034
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.00/91	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	• .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-10	1697	1562	1539	1515	1492	1469	1446	1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	,1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2035	.2005	.1977	.1949	1922	.10.54	.1007
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.424
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area. "Use these common values that result from intercolation:

z score Area

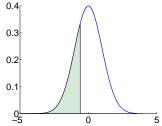
-1.645 0.0500

-2.575 0.0050

0.0050 -

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The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



Ζ	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	,0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	2420	2389	2358	2327	.2296	.2266	2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.424
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area *Use these common values that result from interpolation:



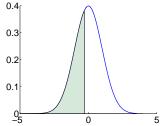
-1.645 0.0500

-2.575 0.0050

0.0050 ৰ-----

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The negative *z* table lists cumulative areas from the left of the center (z = 0). Notice that as the values of *z* increase from -3.5 to 0, so does the cumulative areas (probabilities).



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50					-					
and						2				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
-1.7	.0446	.0436	.0427	,0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516	.0505	* .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	A .0606	,0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	,1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	,1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1863
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.277
-0.4	3446	3409	3372	3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	,4100	,4123	.4030	.4052	.4015	.5014	.3330	.3037	.000
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.424

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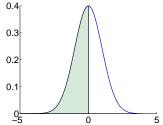
NOTE: For values of z below -3.49, use 0.0001 for the area *Use these common values that result from intercolation:

100



- -1.645 0.0500
- -2.575 0.0050

The negative z table lists cumulative areas from the left of the center (z = 0). Notice that as the values of z increase from -3.5 to 0, so does the cumulative areas (probabilities).



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.50										
and						3				
lower	.0001									
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
-3.3	.0005	,0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
-3.1	.0010	.0009	.0009	.0009	,0008	,0008	.0008	.0008	.0007	.000
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0034
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	* .0049	.004
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	A .0066	.006
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008-
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	,0418	.0409	.0401	.0392	.0384	.0375	.036
-1.6	.0548	.0537	.0526	.0516	.0505	• .0495	.0485	.0475	.0465	.045
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	,0594	.0582	.0571	.055
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.098
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	,1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.245
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2770
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.348
-0.2	.4207	,4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.385
-01	4600	4562	4522	4483	4443	4404	436.4	4325	4286	424
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.464

NOTE: For values of z below -3.49, use 0.0001 for the area

*Use these common values that result from intercolation:

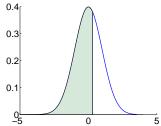
Area z score -1645

-2.575 0.0050

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The positive z table lists cumulative areas from the left which are associated with z scores right of the center (z = 0). Notice the cumulative areas also increase as z increases.

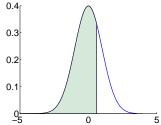


11 0.539 -548 547 557 -559 563 -577 5714 557 25 579 5812 571 575 574 577 5714 577 5714 577 5714 575 6735 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 6775 5774 578 7782 777 6705 6725 6775 7774 6775 7775 6703 5775 7782 777 7785 7776 7795 6703 8776 8778 8778 8778 8778 8778 8778 8778 8778 8778 8778 8788 8860 8860 8877		.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
22 5991 3812 3971 3972 3812 3971 3972 4070 4074 7176 7 7170 7	0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
2 103	2.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
1 0.19 0.21 0.23 0.23 0.23 0.23 0.24 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.65 0.75 0.	0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
53 0915 0939 0939 0939 0939 0939 0939 0939 0939 0939 0939 0939 0939 0939 0937 0737 773 7739 774 7745 773		6179	6217	6255	6293	6331	6368	6406	.6443	.6480	.6517
98 7257 7291 7324 7357 7359 7422 7444 7466 7777 777 75 750 7710 7742 7767 7774 7744 7744 7748 7787 7787 7764 7744 7744 7748 7787 7787 7767 7744 7744 7744 7748 7787 7767 7744 7744 7744 7748 7787 7767 7744 7744 7748 7748 7878 7787 7767 7744 7744 7748 7878 7768 7767 7767 7744 7446 7448 7480 7480 7489 7480 748	0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
V2 V280 V	0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
Bas 7881 7700 7939 7967 7939 7967 7939 8051 8051 8051 8150 <th< td=""><td>0.6</td><td>.7257</td><td>.7291</td><td>.7324</td><td>.7357</td><td>.7389</td><td>.7422</td><td>.7454</td><td>.7486</td><td>.7517</td><td>.7549</td></th<>	0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
30 3159 8159 8159 8159 8159 8159 8159 8150 8	0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0 9413 8-438 8-461 8-468 8506 8531 8554 8577 8599 8599 8590 8570 8729 8790 8770 8790 8790 8720 8729 8790 9780 9781 9800 <t< td=""><td>0.8</td><td>.7881</td><td>.7910</td><td>.7939</td><td>.7967</td><td>.7995</td><td></td><td></td><td></td><td></td><td>.8133</td></t<>	0.8	.7881	.7910	.7939	.7967	.7995					.8133
N Bef43 Bef55 Bef64 Bef63 Bef63 <thbef63< th=""> Bef63 Bef6</thbef63<>	.9	.8159	.8186	.8212	.8238						.8389
2 8840 8859 8869 8907 902 9030 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8907 8927 9305 9315 9115 9117 9118 9117 9118 9117 9118 91	.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
3 90,32 90,42 90,62 90,	1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790		.8830
4 9992 9207 9222 9208 9207 9222 9208 9207 9222 9208 9207 9222 9208 9207 9222 9208 9207 9222 9208 9207 9222 9208 9207 9222 9208 9208 9208 9301 9323 9324 9304 9342 9404 9444 9444 9445 9505 9515 9525 9535 937 9374 937	.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962			.9015
5 9322 9324 9346 9347 9340 9348 9429 9429 7 9354 9463 9444 9484 9455 9505 9505 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9555 9566 9567 9576 9576 9576 9576 9576 9576 9575 9575 9575 9575 9576 9576 9577 9577 9577 9577 9575 <td>3</td> <td>.9032</td> <td>.9049</td> <td>.9066</td> <td>.9082</td> <td>.9099</td> <td>.9115</td> <td></td> <td></td> <td></td> <td>.9177</td>	3	.9032	.9049	.9066	.9082	.9099	.9115				.9177
9 94:2 94:3 94:4 94:4 94:4 94:4 94:5 95:6 95:6 95:6 95:6 95:6 95:6 95:6 95:6 95:7 97:8 97		.9192									.9319
7 954.4 954.4 957.3 952.2 959.1 959.9 96.06 96.06 96.07 97.08 99.08 99.09 99.09 99.09 99.09 99.09 99.09 99.09 99.09 99	5	.9332	.9345	.9357	.9370	.9382	.9394				.9441
a 9641 9649 9658 9664 9671 9778 9780 9880 9882 9882 9882 9882 9882 9881 9880 98	6	.9452	.9463	.9474	.9484	.9495					.9545
9 9713 9718 9726 9726 9721 9737 9738 9738 9738 9738 9738 9738 9738 9738 9738 9738 9736 9736 9738 97	7	.9554	.9564	.9573	.9582						.9633
0 9772 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9778 9788 9881 9884 9885 9886 9886 9887 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 99	8	.9641	.9649	.9656							.9706
1 9621 9226 9823 9824 9824 9824 9824 9826 9850 9851 9871 9875 9876 9877 9877 9978 9877 9978 9977 9977 9977 9977 9977 9977 9977 9977 9977 9977 9978 9985 9986 9986 9986 9986 9986 9986 99898 9986 9986 9	9	.9713	.9719	.9726	.9732	.9738	.9744				.9767
2 9601 9664 9669 9671 9672 9681 9684 9687 9687 3 9693 9966 9680 9901 9902 9902 9903 9903 9903 9903 9903 9903 9903 9903 9903 9903 9903 9903 9903 9903 9913 9933 9934 9942 9922 9922 9923 9934 9946 9946 9946 9946 9946 9946 9946 9946 9946 9946 9946 9947 9975 9970 <td>.0</td> <td>.9772</td> <td>.9778</td> <td>.9783</td> <td>.9788</td> <td>.9793</td> <td></td> <td></td> <td></td> <td></td> <td>.9817</td>	.0	.9772	.9778	.9783	.9788	.9793					.9817
3 9895 9896 9891 9901 9903 9905 9907 9911 9913 9933 5 9938 9940 9920 9922 9927 9927 9928 9931 9933 9932 9954 9 6 9933 9940 9941 9943 3945 9946 9948 9949 9951 99 7 9995 9955 9956 9967 9981 9971 9972 9973 3973 9973 397	1	.9821	.9826	.9830							.9857
4.4 9918 9920 9922 9922 9922 9923 9931 9931 9932 9934 9945 9946 9946 9946 9946 9949 <td< td=""><td></td><td>.9861</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>.9890</td></td<>		.9861									.9890
S 9933 9940 9941 9943 9944 9948 9948 9949 9951 9953 6 9953 9955 9956 9956 9956 9956 9956 9965 9960 9962 9963 9972 9973 9970 9970 9970 9970 9970 9980 3986 9986 9986 9986 9986 9986 9986 9980 3980 3980 3986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 9986 <td>3</td> <td>.9893</td> <td>.9896</td> <td>.9898</td> <td>.9901</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>.9916</td>	3	.9893	.9896	.9898	.9901						.9916
6 9955 9956 9957 9958 9950 9961 9962 A 9963 9973 9980 9980 9980 9980 9980 9980 9980 9980 9980 9990 9990 9991 9911<	4	.9918	.9920	.9922	.9925						.9936
72 9965 9966 9967 9967 9977 9977 9977 9977 9978 9980 9 9 9981 9975 9975 9977 9977 9978 9978 9980 9 9 9981 9982 9986 9987	5	.9938	.9940	.9941							.9952
9 9974 9977 9978 9979 9979 9979 9979 9979 9979 9979 9979 9979 9979 9979 9979 9970 9977 99	.6	.9953	.9955								.9964
3 3981 3982 3982 3983 3984 3985 3986 9986 9986 9986 9986 9986 3988 39898 3988 3988 3											.9974
0 9997 9997 9988 9989 9989 9989 9990 9900 99											.9981
1 9990 9901 9901 9901 9902 9902 9902 9902 9902 9903 9904 9905 9907 99											.9986
2 9993 9994 9994 9994 9995 9995 3 9995 9995 9995 9996 9997 <td>0.</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>.9990</td>	0.										.9990
3 9995 9995 9996 9996 9996 9996 9996 9997 9907 99											.9993
4 9997 99											.9995
Solo 9999 9999 Other area Common Critic Vize bar values of z above 3.49, use 0.9999 for the area. Confidence 4 Confidence 4 Vize bars common values that result from interpolation: Confidence 4 Confidence 4 z storge Area Level Level											.9997
Ind up MOTE: For values of z above 3.49, use 0.9999 for the area. Use these common values that result from interpolation: Confidence of Z score Area Level			.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
NOTE: For values of z above 3.49, use 0.9999 for the area. Common CHI Use these common values that result from interpolation: Confidence of z score Area. Level		.9999									
"Use these common values that result from interpolation: Level											
z score Area	NOTE: Fr	or values of	z above 3	.49, use 0.9	1999 for the	area.					
2 score Area	*Use the	se commor	n values the	at result fro	m interpola	tion:					
1645 0.9500 -	z score	Area									Val
2575 0.9050 0.95	1.645	0.9500	*				_				1.6- 1.9

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The positive *z* table lists cumulative areas from the left which are associated with *z* scores right of the center (z = 0). Notice the cumulative areas also increase as *z* increases.

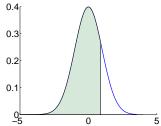


z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.7	.7580	.7611	7642	7673	7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	8078	8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	9554	.9564	.9573	.9582	.9591	A .9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	A .9963	.9964
2.7	.9965	,9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.9999									
and up										
	or values of								Common	
*Use the	ise common	values the	at result fro	m interpola	tion:				Confiden	
z scor									Level	Valu
1.645						_			0.90	1.64
2 575	0.9950	-							0.95	1.96

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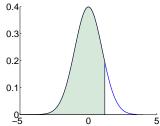
The positive *z* table lists cumulative areas from the left which are associated with *z* scores right of the center (z = 0). Notice the cumulative areas also increase as *z* increases.



- 1	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
2.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
2.7	.7580	.7611	.7642	.7673	,7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.0	.8413	.8438	.8461	8485	8508	.8531	.8554	.8577	.8599	.8621
.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
.7	9554	.9564	.9573	.9582	.9591	A .9599	.9608	.9616	.9625	.9633
.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948		* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961		.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
5.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.9999									
and up										
	or values of								Common	
*Use the	ise commor	values the	at result fro	m interpola	tion:				Confident	
z scor									Level	Valu
1.645	0.9500	*				_			0.90	1.64 1.96



The positive *z* table lists cumulative areas from the left which are associated with *z* scores right of the center (z = 0). Notice the cumulative areas also increase as *z* increases.

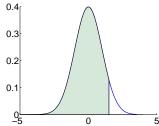


r	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
2.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
3.6	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1,1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
7	.9554	.9564	.9573	.9582	.9591	A .9599	.9608	.9616	.9625	.9633
.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.9999									
and up										
	or values of								Common	
*Use the	ase commor	values the	at result fro	m interpola	ition:	1			Confiden	
z score	e Area					1			Level	Vali
1.645	0.9500	-							0.90	1.6-
2.575	0.9950	1							0.95	1,96

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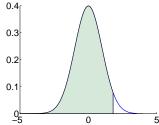


- 1	.00	.01	.02	.03	.04		.05	.06	.07		.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279		.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675		.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064		.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443		.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808		.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157		.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486		.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794		.7823	.7852
3.6	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078		.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340		.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577		.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790		.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980		.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099		.9115	.9131	.9147		.9162	.9177
L4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292		.9306	.9319
6	0770	.0745	0757	0770	0702		0704	0406	0.419		0.430	9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.95/05	.9515	.9525		.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	*	.9599	.9608	.9616		.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693		.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756		.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808		.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850		.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875		.9878	.9881	.9884		.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911		.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927		.9929	.9931	.9932		.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	8	.9946	.9948	.9949	18	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962	Å	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972		.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979		.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985		.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989		.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992		.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994		.9994	.9994	.9995		.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.9996	.9996		.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997		.9997	.9997	.9997		.9997	.9998
3.50	.99999											
and up												
NOTE: F	or values of	z above 3	.49, use 0.9	999 for the	area.						Common C	ritical Va
*Use the	ise commor	values the	at result fro	m interpola	ition:						Confidence	
z scon	e Area										Level	Value
1.645		*									0.90	1.64
2.575		-								_	0.95	1,96

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The positive *z* table lists cumulative areas from the left which are associated with *z* scores right of the center (z = 0). Notice the cumulative areas also increase as *z* increases.

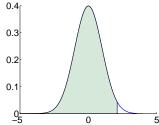


0.0 0.1 0.2			.02	.03	.04	.05	.06	.07		
	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
22	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
3.C	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
D.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
.6	.9452	.9463	.9474	.9484		* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
10	.0011	.00.40	0050	9732	.9738	.9744	.9750	.9756	.9761	.9767
1.9	.9713	.9719	.9726	.9732	.9793	.9744	.9750	.9808	.9812	.9817
2.0	.9772	.9778	.9785	.9788	.9793	.9798	.9846	.9850	.9854	.9857
2.1	.9821	.9826	.9850	.9854	.9875	.9878	.9881	.9884	.9887	.9890
2.2	.9861	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
			.9898	.9901	.9904	.9908	.9931	.9932	.9934	.9936
2.4	.9918	.9920	.9922	.9925	.9927	.9946	.9948		* .9951	.9952
2.5			.9941	.9943	.9945	.9946	.9948		A .9963	.9964
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9903	.9974
2.7	.9965	.9966	.9967	.9968	.9969	.9978	.9979	.9979	.9980	.9981
2.8	.9974			.9977	.9984	.9984	.9985	.9985	.9986	.9986
2.9	.9981	.9982	.9982	.9983	.9984	.9989	.9989	.9989	.9990	.9990
3.0	.9987	.9987	.9987	.9988	.9988	.99992	.9992	.9992	.9993	.9993
3.1	.9990			.9991	.9994	.9994	.9994	.9995	.9995	.9995
3.2 3.3	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9996	.9997
	.9995	.9995	.9995	.9996	.9996	.9996	.9997	.9997	.9997	.9998
3.4 3.50	.9997	.9997	.9997	.9997	.9997	.5557	.3337	.5557	.0001	.3330
and up	.9999									
	1			0007					Common	Cultical M
	or values o									
	ese commo	n values the	at result fro	m interpola	ition:				Confident	ce Critic Valu
Z SCOR									0.90	1.64
1.645						1			0.90	1.64

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The positive z table lists cumulative areas from the left which are associated with z scores right of the center (z = 0). Notice the cumulative areas also increase as z increases.



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	,9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	,9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.99999									
and up										
NOTE: F	or values of	f z above 3	.49, use 0.9	1999 for the	area.				Common	Critical \
*Use the	ese commor	n values th	at result fro	m interpola	tion:				Confident	
z scon	e Area					1			Level	Vali
	0.9500	-				_			0.90	1.64
1.645									0.95	1.96

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Try this! Find P(z < 2.37)

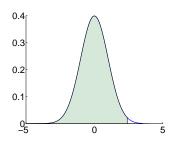


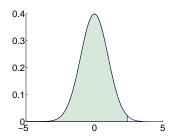
TABLE A	-2 (co	ntinued) Cumula	ative Are	a from t	the LEFT				
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	,5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	,6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	,7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	,9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	0961	0964	0000	0971	0975	0979	0881	GRR4	9887	9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	9918	.9920	.9922	.9925	.9927	19979	.5531	.9932	.5554	.0000
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961		A .9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.99999									
and up										
				1999 for the						Critical Va
*Use the	ese commo	n values th	at result fro	m interpola	tion:					ce Critica
z scor	e Area								Level	Value
1.645	0.9500	-							0.90	1.645
2.575	0.9950	-							0.95	1.96
									0.99	2.575

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Try this! Find P(z < 2.37)

P(*z* < 2.37) = 0.9911



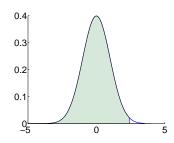
-2 (co	ontinued	/							
.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
0961	0964	0000	0971	0975	0979	0881	GRR4	9887	9890
.9893	.9896	.9898	.9901	.9904	.9906	.9905	.9911	.9913	.9916
.9918	.9920	.9922	.9925	.9927	.9929	.9948	.9949	* .9951	.9952
.9938	.9940		.9943	.9959	.9960	.9961	.9962	A .9963	.9964
.9953	.9955	.9956	.9957	.9959	.9960	.9901	.9962	.9973	.9974
.9965		.9967	.9968	.9969	.9978	.9979	.9979	.9980	.9981
.9974	.9975	.9976	.9977	.9984	.9984	.9985	.9985	.9986	.9986
		.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
.9987	.9987	.9987	.9988	.9966	.99992	.9992	.9992	.9993	.9993
.9990			.9991	.9994	.9994	.9994	.9995	.9995	.9995
.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9996	.9997
.9995	.9995	.9995	.9996	.9996	.9996	.9997	.9997	.9997	.9998
.9997	.9997	.9997	.9997	.9997	.5557	.335/	.5557	.0001	
.99999							2.00		
	of z above 3	40	000 feet like			-		Common	Critical Va
								Confident	
	on values the	at result fro	m mierpola	CON.				Level	Value
Area									1.645
									1.96
0.995	0 ৰ								2.575
0.950 0.995	c								< ─────────────────────

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Try this! Find P(z < 2.37)

P(z < 2.37) = 0.9911



Did you notice that in order to find the probability in the table we split the number z = 2.37into two parts: 2.3 and 0.07? (2.37 = 2.3 + .07)

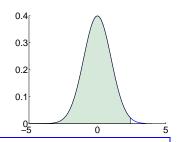
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	,5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	0961	0964	0000	0971	0975	9979	9881	98R4	9RR7	9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9905	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9948	.9949	* .9951	.9952
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	A .9963	.9964
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.996	.9962	.9903	.9974
2.7	.9965	.9966	.9967	.9968	.9969	.9978	.9979	.9979	.9980	.998
2.8	.9974	.9975	.9976	.9977	.9984	.9984	.9985	.9985	.9986	.9986
2.9			.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.0 3.1	.9987	.9987	.9987	.9988	.9966	.9989	.9992	.9992	.9993	.9993
3.1	.9990	.9993	.9994	.9991	.9994	.9994	.9994	.9995	.9995	.9995
3.2	.9995	.9995	.9994	.9996	.9996	.9996	.9996	.9996	.9996	.9993
3.4	.9995	.9995	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.99997	.9997	.9997	.0001				.5557	10001	
and up							(
NOTE:	For values o	f z above 3	.49, use 0.9	1999 for the	area.				Common	Critical
	ese commo								Confiden	ce Crit
Z SCO									Level	Val
1.64		-							0.90	1.6
2.57									0.95	1.9

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Try this! Find P(z < 2.37)

P(*z* < 2.37) = 0.9911



The first part, 2.3, tells us what <u>row</u> to look up in the table. The second part, .07, identifies what <u>column</u> to look at. The intersection of the row and column gives the probability (area).

r	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	,5199	.5239	.5279	.5319	.5359
2.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	,6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
3.6	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
D.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	0961	0964	0969	0.9.71	0975	9979	9881	GRR4	QRR7	9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	9918	.9920	.9922	.9925	.9927	.9929	.9948	.9949	× .9951	.9952
2.5	.9938	.9940	.9941	.9943				.9949	A .9963	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9905	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9979	.9972	.9980	.9981
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9975	.9979	.9980	.9986
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9989	.9990	.9990
3.0	.9987	.9987	.9987	.9988	.9966	.9989	.9992	.9992	.9993	.9993
3.1	.9990	.9993	.9994	.9991	.9994	.9994	.9994	.9995	.9995	.9995
3.2	.9993	.9995	.9994	.9996	.9996	.9996	.99996	.9996	.9996	.9997
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9997	.9997	.9997	.9998
3.4 3.50	.99997	.9997	.9997	.9997	.99937	.9997	.3357	.5557	.0001	
and up	.99999							Sec.		
	or values of	La altanza T	40	000 feet like			-		Common	Critical V
	ise commor								Confiden	
		i values un	at result fro	minterpola	ICIUIT.				Level	Vali Vali
z scor									0.90	1.64
1.645	0.9500					-			0.95	1.96

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Try this! Find the area between z = -1.51 and z = 2.37.





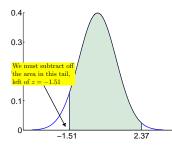
z	.00	.01	.02	.03	.04		.05	.06	.07		.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279		.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675		.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064		.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443		.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808		6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157		.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486		.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794		.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078		.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340		8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577		.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790		.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980		.8997	.9015
1.3	.9032	.9049	.9066	.9082	.90/99		.9115	.9131	.9147		.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292		.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418		.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.9505	.9515	.9525		.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	*	.9599	.9608	.9616		.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693		.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756		.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808		.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850		.9854	.9857
2.2	0.961	0964	0000	0971	0975		0979	0881	GRR4	_	GRR7	9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9905	.9911		.9913	.9916
2.4	9918	.9920	.9922	.9925	.9927		19979	.5551	.5552	-	.5554	.9952
2.5	.9938	.9940	.9941	.9943	.9945		.9946	.9948	.9949	*	.9951	
2.6	.9953	.9955	.9956	.9957	.9959	-	.9960	.9961	.9962			.9964
2.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972		.9973 .9980	.9974
2.8	.9974	.9975	.9976	.9977	.9977	-	.9978	.9979	.9979		.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985			
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989		.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992		.9993	.9995
3.2	.9993	.9993	.9994	.9994	.9994	-	.9994	.9994	.9995		.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.9997	.9996		.9996	.99997
3.4	.9997	.9997	.9997	.9997	.9997	-	.9997	.9997	.9997		.99997	.9990
3.50	.99999											
and up						-				-		
	For values o										Common C	
	ese commo	n values the	at result fro	m interpola	tion:					11	Confidence	
Z SCO											Level	Valu
1.645						_				1	0.90	1.6-4
2.57	5 0.9950	-								_	0.95	1.96

Try this! Find the area between z = -1.51 and z = 2.37.



POSITIVE z Scores

Hint: Because Table A-2 gives cumulative areas from the left, we must find the area left of z = 2.37, then subtract from this the area that is left of z = -1.51.



	.00	.01	.02	.03	.04		.05	.06	.07	.0	08	.09
0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.5	319	.5359
1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675	.5	714	.5753
2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.6	103	.6141
3	,6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.6-	480	.6517
.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808	.68	344	.6879
.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.7	190	.7224
.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486	.7	517	.7549
1.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.71	323	.7852
.8	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.8	106	.8133
.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340	.8	365	.8389
0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577	.8	599	.8621
1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790	.8	B10	.8830
2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.8	997	.9015
3	.9032	.9049	.9066	.9082	.90/99		.9115	.9131	.9147	.9	162	.9177
4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292			.9319
5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.9-	429	.9441
6	.9452	.9463	.9474	.9484	.9495	*	.9505	.9515	.9525	.9	535	.9545
7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616			.9633
8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693	.91	599	.9706
9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.9	761	.9767
.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808		812	.9817
1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850			.9857
- 0	0961	0964	0969	0971	0975	-	0979	9881	GRR4		RR7	9890
.3	.9893	.9896	.9898	.9901	.9904		.9906	.9905	.9911	.9	913	.9916
_4	.9918	.9920	.9922	.9925	.9927		13373	.5551	.9952	.0		.5550
5	.9938	.9940	.9941	.9943	.9945		.9946	.9948	.9949			.9952
.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962			.9964
.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972			.9974
.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979		980	.9981
.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985			.9986
.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989			.9990
.1	.9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992			.9993
.2	.9993	.9993	.9994	.9994	.9994	_	.9994	.9994	.9995			.9995
.3	.9995	.9995	.9995	.9996	.9996		.9996	.9996	.9996		996	.9997
.4	.9997	.9997	.9997	.9997	.9997	-	.9997	.9997	.9997	.9	997	.9998
.50	.9999											
nd up								-				
	or values o										mmon Cr	
*Use th	ese commo	n values th	at result fro	m interpola	tion:						nfidence	
Z SCO	e Area										Level	Valu
1.64	0.9500	-				_					0.90	1.64
2.57	0.9950	-									0.95	1.96

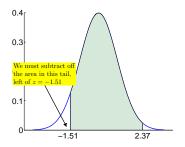
(ロ) (団) (E) (E) (E) (O)(0)

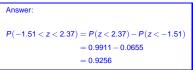
Try this! Find the area between z = -1.51 and z = 2.37.



POSITIVE z Scores

Hint: Because Table A-2 gives cumulative areas from the left, we must find the area left of z = 2.37, then subtract from this the area that is left of z = -1.51.





z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	,7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	* .9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	0.961	0964	0000	0971	0975	0979	0881	GRR4	GRR7	9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9905	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	19979	19991	.5552	.0034	.5550
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	A .9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9995
3.50 and up	.99999									
NOTE:	For values o	f z above 3	.49, use 0.9	1999 for the	area.				Common C	ritical '
	ese commo								Confidence	
z sco						1			Level	Val

◆□▶ ◆□▶ ◆□▶ ◆□▶ □ ● のへの

0.99 2.575

Try this! Find the probability, P(z > 2.37).





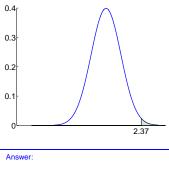
r	.00	.01	.02	.03	.04		.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.7823	.7852
8.C	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.8106	.8133
D.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.90/99		.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.95/05	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850	.9854	.9857
2.2	0961	0964	0000	0971	0975		0979	0881	GRR4	GRR7	9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927		.9929	9948	9949	* .9951	.9952
2.5	.9953	.9940	.9941	.9943	.9959		.9960	.9961	.9962	A .9963	.9964
2.0	.9953	.9955	.9950	.9957	.9969		.9970	.9971	.9972	.9973	.9974
2.8	.9965	.9900	.9976	.9977	.9977		.9978	.9979	.9979	.9980	.9981
2.8	.9974	.9982	.9982	.9983	.9984		.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989	.9990	.9990
3.1	.9987	.9987	.9991	.9991	.9992		.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994		.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.99996	.9996	.9996	.9997
5.5 3.4	.9995	.9995	.9997	.9997	.9997		.9997	.9997	.9997	.9997	.9998
5.4 3.50	.99997	.9997	.9997	.0001						10001	
and up	.5555								See State		
	For values o	f z obouo 7	49 uro 0 9	1999 for the	area					Common	Critical V
	ese commo									Confiden	
		n vaides th	ac result ino	minimerpola	APARTS.					Level	Valu
Z SCO										0.90	1.64
1.64	5 0.9500	*				_				0.95	1.96

Try this! Find the probability, P(z > 2.37).



POSITIVE z Scores

We make use of the fact that the total area under the probability density curve is 1. Because Table A-2 gives cumulative areas from the left, we must find the area left of z = 2.37, then subtract this from 1.

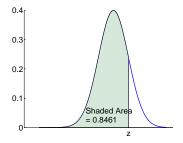


P(z > 2.37) = 1 - P(z < 2.37)	
= 1 - 0.9911	
= 0.0089	

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.862
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10 .8997	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.9147	.9162	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9151	.9147	.9306	.9319
1.4 1.5	.9192	.9207	.9222	.9236	.9251	.9205	.9406	.9418	.9429	.944
1.5	.9352	.9545	.9557	.9484		* .95/05	.9515	.9525	.9535	.9545
1.6	.9452	.9463	.9474	.9582	.9591	A .9599	.9608	.9616	.9625	.9633
1.7	.9554	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9041	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.976
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
21	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.985
2.2	0961	0964	0969	0971	0975	0979	0881	GRR4	9887	9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9905	.9911	.9913	.9916
2.4 2.5	.9918	.9920	.9922	.9925	.9927	.9929	.9948	.9949	* .9951	.995
2.5	.9953	.9940	.9941	.9943	.9959	.9960	.9961	.9962	A .9963	.996
2.5	.9953	.9955	.9950	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.998
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.998
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9999
3.1	,9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.999
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.999
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.999
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9999
3.50	.9999									
and up										
NOTE: I	or values o	f z above 3	.49, use 0.9	999 for the	area.				Common (Critical
*Use th	ese commo	n values the	at result fro	m interpola	tion:				Confidenc	
Z SCO	e Area								Level	Va
1.645		-							0.90	1.6

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Try this! Find the *z* score associated with a probability value of 0.8461.



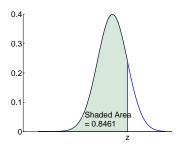
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Try this! Find the z score associated with a probability value of 0.8461.



POSITIVE z Scores

We make use of the fact that the positive z table gives probabilities that are between 0.5 and 1, inclusive, to deduce that the given probability value is on the positive z table.



z	.00	.01	.02	.03	.04		.05	.06	.07	.08		.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.531	э	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675	.571	4	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.610	3	.6141
0.3	,6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.648	0	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808	.684	4	.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.719		.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486	.751		.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.782	3	.7852
0.8	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.810		.8133
0.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340	.836		.8389
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577	.859		.8621
1.1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790	.881	0	.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.899		.9015
1.3	.9032	.9049	.9066	.9082	.9099		.9115	.9131	.9147	.916		.9177
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292	.930		.9319
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.942		.9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.95/05	.9515	.9525	.953		.9545
1.7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616	.962		.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693	.969		.9706
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.976		.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808	.981		.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850	.985		.9857
2.2	.9861	.9864	.9868	.9871	.9875		.9878	.9881	.9884	.988		.9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911	.991		.9916
2.4	.9918	.9920	.9922	.9925	.9927		.9929	.9931	.9932	.993		.9936
2.5	.9938	.9940	.9941	.9943	.9945		.9946	.9948	.9949	* .995		.9952
2.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962	A .996		.9964
2.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972	.997		.9974
2.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979	.998		.9981
2.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985	.998		.9986
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989	.999		.9990
3.1	.9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992	.999		.9993
3.2	.9993	.9993	.9994	.9994	.9994		.9994	.9994	.9995	.999		.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.9996	.9996	.999		.9997
3.4	.9997	.9997	.9997	.9997	.9997		.9997	.9997	.9997	.999	97	.9998
3.50	.9999											
and up												
	or values o											Critical Ve
*Use th	ese commo	n values the	at result fro	m interpola	ition:							e Critic
z sco	e Area										wel	Valu
1.64	0.9500										.90	1.64
2.57	5 0.9950	-								0	.95	1.96

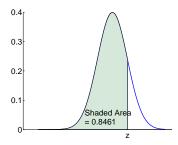
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Try this! Find the *z* score associated with a probability value of 0.8461.



POSITIVE z Scores

We make use of the fact that the positive z table gives probabilities that are between 0.5 and 1, inclusive, to deduce that the given probability value is on the positive z table. We need to locate the probability closest to 0.8461, then use the row and column intersection to determine the corresponding value of z.



r	.00	.01	.02	.03	.04		.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808		.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486		.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.7823	.7852
8.C	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	0010	.8238	.8264		.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	8485	.8508		.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	4.0000	.8708	.8729		.8749	.8770	.8790		.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099		.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.95/05	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693	.9699	.9706
.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875		.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927		.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945		.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962	A .9963	.9964
2.7	.9965	,9966	.9967	.9968	.9969		.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989	.9990	.9990
3.1	,9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994		.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997		.9997	.9997	.9997	.9997	.9998
3.50	.9999										
and up											
NOTE:	For values o	f z above 3	.49, use 0.9	1999 for the	area.					Common Cr	itical V
"Use th	ese commo	n values the	at result fro	m interpola	tion:					Confidence	Critic
Z SCO										Level	Valu
1.64		-								0.90	1.64
2.57										0.95	1.96

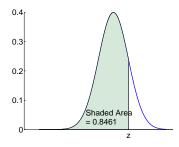
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Try this! Find the *z* score associated with a probability value of 0.8461.



POSITIVE z Scores

We make use of the fact that the positive z table gives probabilities that are between 0.5 and 1, inclusive, to deduce that the given probability value is on the positive z table. We need to locate the probability closest to 0.8461, then use the row and column intersection to determine the corresponding value of z.



Answer:

The row and column intersection give us two parts of the desired z value, 1.0 and .02. Putting these values together gives us the answer, z = 1.02

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	5120	.5160	.5199	.5239	.5279	.5319	.535
0.1	.5398	.5438	5478	5517	.5557	.5596	.5636	.5675	.5714	.575
0.2	.5793	.5832	.5871	5910	.5948	.5987	.6026	.6064	.6103	.614
0.3	,6179	.6217	.6255	6293	.6331	.6368	.6406	.6443	.6480	.651
0.4	.6554	.6591	.6628	6664	.6700	.6736	.6772	.6808	.6844	.687
0.5	.6915	.6950	.6985	7019	.7054	.7088	.7123	.7157	.7190	.722
0.6	,7257	.7291	.7324	7357	.7389	.7422	.7454	.7486	.7517	.754
0.7	.7580	.7611	.7642	7673	.7704	.7734	.7764	.7794	.7823	.785
0.8	.7881	.7910	.7939	7967	.7995	.8023	.8051	.8078	.8106	.813
0.9	8159	8186	8212	8238	.8264	.8289	.8315	.8340	.8365	.838
1.0	.8413	.8438	.8461	8485	.8508	.8531	.8554	.8577	.8599	.862
1.2	.8849	.8869	.8888	8907	.8925	.8944	.8962	.8980	.8997	.901
1.3	.9032	.9049	.9066	9082	.9099	.9115	.9131	.9147	.9162	.917
1.4	.9192	.9207	.9222	9236	.9251	.9265	.9279	.9292	.9306	.931
1.5	.9332	.9345	.9357	9370	.9382	.9394	.9406	.9418	.9429	.94
1.6	.9452	.9463	.9474	9484	.9495	* .9505	.9515	.9525	.9535	.954
1.7	.9554	.9564	.9573	9582	.9591	.9599	.9608	.9616	.9625	.963
1.8	.9641	.9649	.9656	9664	.9671	.9678	.9686	.9693	.9699	.970
1.9	.9713	.9719	.9726	9732	.9738	.9744	.9750	.9756	.9761	.976
2.0	.9772	.9778	.9783	9788	.9793	.9798	.9803	.9808	.9812	.981
2.1	.9821	.9826	.9830	9834	.9838	.9842	.9846	.9850	.9854	.985
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.989
2.3	.9893	.9896	.9898	9901	.9904	.9906	.9909	.9911	.9913	.99
2.4	.9918	.9920	.9922	9925	.9927	.9929	.9931	.9932	.9934	.993
2.5	.9938	.9940	.9941	9943	.9945	.9946	.9948	.9949	* .9951	.99!
2.6	.9953	.9955	.9956	9957	.9959	.9960	.9961	.9962	A .9963	.996
2.7	.9965	.9966	.9967	9968	.9969	.9970	.9971	.9972	.9973	.991
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.991
2.9	.9981	.9982	.9982	9983	.9984	.9984	.9985	.9985	.9986	.998
3.0	.9987	.9987	.9987	9988	.9988	.9989	.9989	.9989	.9990	.999
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.999
3.2	.9993	.9993	.9994	9994	.9994	.9994	.9994	.9995	.9995	.999
3.3	.9995	.9995	.9995	9996	.9996	.9996	.9996	.9996	.9996	.999
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.999
3.50	.9999									
and up			6	1					Common	a
			.49, use 0.9							
		n values th	at result fro	m interpola	ition:				Confiden Level	ce Cri Vi
Z SCOR									0.90	1
1.645	0.9500	-				1			0.90	1.

◆□▶ ◆□▶ ◆□▶ ◆□▶ □ ○ ○ ○

Tim Busken

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Chapter 6

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The Normal Distribution

The Standard Normal Distribution

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Sampling Distribution of the Variance

Other Sampling Distributions

Unbiased and Biased Estimators

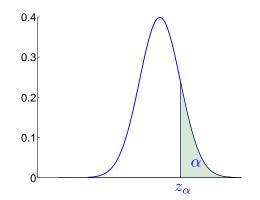
The Central Limit Theorem (CLT)

Another Random Experiment

Works Cited

z_{α} Notation

The expression z_{α} denotes the *z* score with an area of α to its *right*.

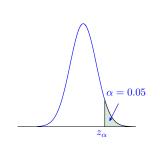


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POSITIVE z Scores

	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	,6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
).5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8830
2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
3	.9032	.9049	.9066	.9082	.90/99	.9115	.9131	.9147	.9162	.9177
4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
1.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	A .9963	.9964
.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
5.50	.9999									
and up										
	or values o									n Critical Va
*Use th	ese commo	n values the	at result fro	m interpola	tion:					nce Critica
Z SCO	e Area								Level	
1.645									0.90	
2.575	5 0.9950	-							0.95	1.96

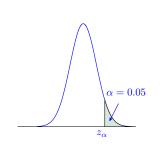


Try this! Find z_{α} if $\alpha = 0.05$.

We draw a normal distribution and locate z_{α} along the horizontal axis, far right of center. We suppose the area right of z_{α} is $\alpha = 0.05$.



POSITIVE z Scores



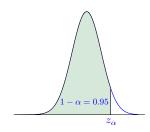
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	,6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
3.6	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
D.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
.6	.9452	.9463	.9474	.9484		* .9505	.9515	.9525	.9535	.9545
.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906		.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960		.9962	A .9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970		.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984		.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
5.1	.9990	.9991	.9991	.9991	.9992	.9992		.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994		.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996		.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.50	.9999									
and up										
NOTE: P	or values of	z above 3	.49, use 0.9	999 for the	area.				Common	Critical Va
	ise common								Confident	
z scor									Level	Value
1.645		-							0.90	1.645
	0.9950								0.95	1.96

Try this! Find z_{α} if $\alpha = 0.05$.

We draw a normal distribution and locate z_{α} along the horizontal axis, far right of center. We suppose the area right of z_{α} is $\alpha = 0.05$.

Because of the way the table is constructed, with cumulative areas left of some critical value of z, we must use the fact that total area under the the curve is 1. The area left of z_{α} is

 $1 - \alpha = 1 - 0.05 = 0.95.$





POSITIVE *z* Scores

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7853
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.862
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8B10	.8834
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.901
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.931
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.944
1.6	.9452	.9463	.9474	.9484		* .9505	.9515	.9525	.9535	.954
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.963
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.970
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.976
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.985
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.989
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9910
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.993
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	* .9951	.995
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	A .9963	.996
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.997
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.998
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.998
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.999
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.999
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.999
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.999
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.999
3.50	.9999									
and up	For values o		10 00						Common	Cultical
	-or values c ese commo								Confiden	
		n values th	at result fro	m interpola	ttion:				Level	ce Crit Va
Z SCO									0.90	1.6
1.645	0.9500	*				-			0.90	1.9

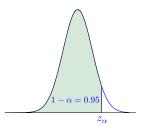
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Try this! Find z_{α} if $\alpha = 0.05$.

We draw a normal distribution and locate z_{α} along the horizontal axis, far right of center. We suppose the area right of z_{α} is $\alpha = 0.05$.

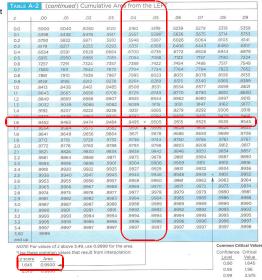
Because of the way the table is constructed, with cumulative areas left of some critical value of z, we must use the fact that total area under the the curve is 1. The area left of z_{rr} is

 $1 - \alpha = 1 - 0.05 = 0.95$



Answer:

We find two probability values equally close to 0.95; and these values are associated with z = 1.64 and z = 1.65. Notice the asterisk between these two numbers points us to the bottom left portion of the table which tells us to take z = 1.645 (the midpoint between z = 1.64 and z = 1.65) as the answer.



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POSITIVE z Scores

Try this! Find the *z*-score associated with P_{90} , the 90th percentile.



POSITIVE z Scores

z	.00	.01	.02	.03	.04		.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790	.8B10	.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099		.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.95/05	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875		.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927		.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945		.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962	A .9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994		.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997		.9997	.9997	.9997	.9997	.9998
3.50	.99999										
and up											
NOTE: F	or values o	f z above 3	.49, use 0.9	1999 for the	area.					Common	Critical Va
*Use the	ese commo	n values th	at result fro	m interpola	ition:					Confident	e Critica
z scor	e Area									Level	Value
1.645		-								0.90	1.645
2.575										0.95	1.96
	2.0000									0.99	2.575

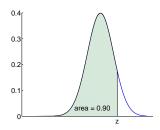
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Try this! Find the z-score associated with P₉₀, the 90th percentile.



POSITIVE z Scores

Recall that P90 separates the lower 90% from the upper 10%. We locate a z value along the horizontal axis, far left of center, and assign the probability or area to the left of the z value to be 0.9000. Afterwards, we look in the body of the positive z table for 0.9000, then determine from the row and column intersection the correct value of z.



z	.00	.01	.02	.03	.04		.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557		.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729		.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099		.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	*	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671		.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875		.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927		.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945		.9946	.9948	.9949	* .9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984		.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988		.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992		.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994		.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996		.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997		.9997	.9997	.9997	.9997	.9998
3.50	.9999										
and up											
NOTE: F	or values o	f z above 3	.49, use 0.9	1999 for the	area.					Common	Critical \
*Use the	ese commo	n values the	at result fro	m interpola	tion:					Confiden	
z scor	e Area									Level	Valu
1.645		-								0.90	1.64
2.575										0.95	1.96

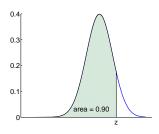
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Try this! Find the *z*-score associated with P_{90} , the 90th percentile.



POSITIVE z Scores

Recall that P_{90} separates the lower 90% from the upper 10%. We locate a z value along the horizontal axis, far left of center, and assign the probability or area to the left of the z value to be 0.9000. Afterwards, we look in the body of the positive z table for 0.9000, then determine from the row and column intersection the correct value of z.



Answer:

It seems as if there are two probabilities in the table closest to 0.9, namely 0.8997 and 0.9015. Since 0.8997 is so much closer to 0.9 than 0.9015 is, we take z = 1.28 to be the best approximate value of z associated with P_{90} .

z	.00	.01	.02	.03	.04		.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160		.5199	.5239	.5279	.5319	.535
0.1	.5398	.5438	.5478	,5517	.5557		.5596	.5636	.5675	.5714	.575
0.2	.5793	.5832	.5871	.5910	.5948		.5987	.6026	.6064	.6103	.614
0.3	,6179	.6217	.6255	.6293	.6331		.6368	.6406	.6443	.6480	.651
0.4	.6554	.6591	.6628	.6664	.6700		.6736	.6772	.6808	.6844	.687
0.5	.6915	.6950	.6985	.7019	.7054		.7088	.7123	.7157	.7190	.722-
0.6	.7257	.7291	.7324	.7357	.7389		.7422	.7454	.7486	.7517	.754
0.7	.7580	.7611	.7642	.7673	.7704		.7734	.7764	.7794	.7823	.785
0.8	.7881	.7910	.7939	.7967	.7995		.8023	.8051	.8078	.8106	.813
0.9	.8159	.8186	.8212	.8238	.8264		.8289	.8315	.8340	.8365	.838
1.0	.8413	.8438	.8461	.8485	.8508		.8531	.8554	.8577	.8599	.862
11	06.47	0000	0000	07/10	0720		9749	9770	8790	8810	997
1.2	.8849	.8869	.8888	.8907	.8925		.8944	.8962	.8980	.8997	.901
1.3	.9032	.9049	.9066	.9082	.9099		.9115	(915)	.3147	.5102	.917
1.4	.9192	.9207	.9222	.9236	.9251		.9265	.9279	.9292	.9306	.931
1.5	.9332	.9345	.9357	.9370	.9382		.9394	.9406	.9418	.9429	.944
1.6	.9452	.9463	.9474	.9484	.9495		.95/05	.9515	.9525	.9535	.954
1.7	.9554	.9564	.9573	.9582	.9591		.9599	.9608	.9616	.9625	.963
1.8	.9641	.9649	.9656	.9664	.9671	_	.9678	.9686	.9693	.9699	.970
1.9	.9713	.9719	.9726	.9732	.9738		.9744	.9750	.9756	.9761	.976
2.0	.9772	.9778	.9783	.9788	.9793		.9798	.9803	.9808	.9812	.981
2.1	.9821	.9826	.9830	.9834	.9838		.9842	.9846	.9850	.9854	.985
2.2	.9861	.9864	.9868	.9871	.9875		.9878	.9881	.9884	.9887	.989
2.3	.9893	.9896	.9898	.9901	.9904		.9906	.9909	.9911	.9913 .9934	.991
2.4	.9918	.9920	.9922	.9925	.9927		.9929	.9931	.9932	.9934 * .9951	.995
2.5	.9938	.9940	.9941	.9943	.9945		.9946	.9948		A .9963	.995
2.6	.9953	.9955	.9956	.9957	.9959		.9960	.9961	.9962	.9905	.996
2.7	.9965	.9966	.9967	.9968	.9969		.9970	.9971	.9972	.9975	.998
2.8	.9974	.9975	.9976	.9977	.9977		.9978	.9979	.9979	.9986	.998
2.9	.9981	.9982	.9982	.9983	.9988		.9989	.9989	.9989	.9990	.999
3.0	.9987	.9987	.9987	.9988	.9988		.99992	.9992	.9992	.9993	.9999
3.1	.9990	.9991 .9993	.9991	.9991	.9994		.9994	.9994	.9995	.9995	.999
3.2 3.3	.9993	.9995	.9994	.9996	.9996		.9996	.9996	.9996	.9996	.999
3.4	.9995	.9995	.9997	.9997	.9997		.9997	.9997	.9997	.9997	.999
3.50	.99997	.9997	.5557	.5557	.0031	-		.33331		10001	
and up	.5555										
	For values of	a altanta 7	40	000 feet blue						Common C	itical
	ese common									Confidence	
		i values th	at result fro	m mierpoia	cion.					Level	Va
Z SCOR										0.90	1.6
1.645	0.9500	*				-				0.95	1.5

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6.4 Sampling Distributions

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Sampling Distributions

The key point of Section 6.4 is to introduce the concept of a **sampling distribution of a statistic**, which is the distribution of all values of that statistic when all possible samples of the same size are taken from the same population.

Consider the goal of trying to find the true proportion of all Alzheimer's patients who *will have* a particular side effect *if* they take an experimental drug that a pharmaceutical company wants to test. Because it is impossible and impractical to conduct a census, the drug manufacturer, with the FDA's approval, conducts clinical trials or repeated samples of Alzheimer's patients. The drug is given to the patients and the sample proportions are calculated. That is, the proportion of patients from each sample experiencing the undesired side effect is determined. [1]

Conclusions the pharmaceutical company makes require that they understand the behavior of the sampling distribution of all such sample proportions. Though they may have only one or a few samples, meaningful conclusions can be drawn from sample results about the population of all Alzheimer's patients who would likely suffer from the side effect.

A major goal of the rest of the textbook is to learn how we can effectively use a sample to form conclusions about a population.

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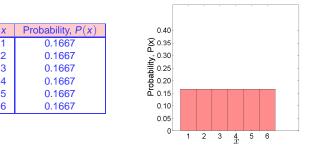
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<u>Recall</u>: The probability distribution from tossing a single die.



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The mean, μ , of this probability distribution is

$$\mu = \sum x \cdot P(x) = 3.5$$

Now, consider the following random experiment.

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Another Random Experiment

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Random Experiment

Roll a die 5 times, and each time record the number on the top face of the die. Calculate the mean, \overline{x} , of the five values.[2]

That sample mean is a number between 1 and 6. Suppose the experiment is repeated many times, and that each time the sample mean is recorded.

In addition, suppose we sort the sample means into 26 classes. That is, a tally mark is made in one of 26 classes each time a mean is recorded.

Suppose that as we continue this experiment, from time to time we plot a histogram of the classes and their associated frequencies. The animation (right) shows what our histograms might look like.

The number of trials represents the number of times the experiment is repeated.

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Sampling Distribution of the Mean

Definition

The sampling distribution of the mean is the probability distribution of sample means, with all samples having the same sample size *n* taken from the same population.

The animation (right) simulates the repeated experiment up to 20,000 times, but the *true* sampling distribution of the mean involves repeating the experiment *indefinitely*.

The actual sampling distribution would reflect *all* possible samples, not just a few or several thousand.

As the experiment is repeated several times, the distribution of means takes on a bell shape; and the mean, $\mu_{\overline{x}}$, of the sample means tends to reflect the *actual* mean, $\mu = 3.5$. (The animation illustrates frequencies of sample means piling up along the *x* axis around 3.5)

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The previous experiment introduces the concept of the sampling distribution of the mean.

Properties of the Sampling Distribution of the Mean

Sample means tend to target the value of the population mean. (That is, the mean of the sample means is the population mean. The expected value of the sample mean is equal to the population mean.)

The distribution of the sample means tends to be a normal distribution.

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x

2

3

4 5

6

0.1667

0.1667

0.1667

0.1667

0.1667

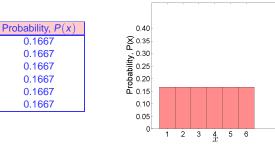
0.1667

Normal Distribution

Sampling Distribution of the Variance

Recall: The probability distribution from tossing a single die.





The variance, σ^2 , of this probability distribution is

$$\sigma^2 = \frac{\sum (x-\mu)^2}{N} = 2.9$$

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Random Experiment

Roll a die 5 times, and each time record the number on the top face of the die. Calculate the variance, s^2 , of the five values.[2]

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Additionally suppose while repeating the experiment the variance of each sample was recorded, and sorted into one of 16 classes.

The animation (right) shows what our histograms might look like. The number of samples represents the number of times the experiment is repeated.

Notice this time the mean of the sample variances targets the population variance, $\sigma^2 = 2.9$; and the distributions are skewed right.

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Definition

The sampling distribution of the variance is the probability distribution of sample variances, with all samples having the same sample size n taken from the same population.

Properties of the Sampling Distribution of the Variance

- ✓ Sample variances tend to target the value of the population variance, σ^2 . (That is, the mean of the sample variances is the population variance. The expected value of the sample variance is equal to the population variance.)
- \checkmark The distribution of the sample means tends to be a distribution skewed to the right.

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Definition

The **sampling distribution of a statistic** is the relative frequency distribution of that statistic that is approached as the number of samples (not the sample size!) approaches infinity.

Got Sampling Distributions?

What about the sampling distributions of sample

- 1 proportions,
- medians,
- 3 ranges and
- 4 standard deviations?

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Definition

An unbiased estimator is a sample statistic that has a sampling distribution whose mean is equal to the mean of the corresponding population parameter. An unbiased estimator tends to target or be reflective of the true value of the population parameter it is estimating.

Unbiased Estimators:

1 Mean \overline{x} Variance s^2

variance s-

8 Proportion p̂

Definition

A biased estimator is a sample statistic that has a sampling distribution whose mean is not equal to the mean of the corresponding population parameter. A biased estimator $\overline{does \ not}$ target the true value of the population parameter it is estimating.

Biased Estimators:

- Median
- 2 Range
- 3 Standard Deviation s

The bias of the sample standard deviation is relatively small in large samples, so s is often used as an unbiased estimator.

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Sampling Distribution Facts

- All statistics, not just the mean, have sampling distributions.
- There is a different sampling distribution for each value of *n*, the sample size.
- $\mu_{\overline{x}}$ is the notation used to represent the mean of a sampling distribution.
- $\sigma_{\overline{x}}$ is the notation used to represent the standard deviation of a sampling distribution.

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6.5 The Central Limit Theorem (CLT)

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The Central Limit Theorem (CLT)

If random samples of *n* observations are drawn from a nonnormal population with mean μ and standard deviation σ , then, when *n* is large, the sampling distribution of the sample means is approximately normally distributed, with mean and standard deviation

$$\mu_{\overline{x}} = \mu$$
 and $\sigma_{\overline{x}} = \frac{\sigma}{\sqrt{n}}$

The approximation becomes more accurate as *n* becomes large.

The CLT can be applied to *any* probability distribution (continuous or discrete). We will use the following guidelines for our work:

- For a population with *any* distribution, if n > 30, then the sample means have a distribution that can be approximated by a normal distribution with mean μ and standard deviation σ / \sqrt{n} .
- If n ≤ 30 and the original population has a normal distribution, then the sample means have a normal distribution with mean μ and standard deviation σ / √n.
- If n ≤ 30 and the original population does not have a normal distribution, then we do not apply the CLT.
- When the sampled population is approximately symmetric, the sampling distribution of x
 becomes approximately normal for relatively small values of n.

Consider the roughly symmetric probability distribution given in the top left figure of the adjacent box (right). The mean of the distribution, μ , was found to be 20.3873. Suppose we repeatedly take random samples of different sizes, *n*, from this distribution.

A data entry in a sample would be an x value between 1 and 43. Also suppose that each time a sample is taken, the sample mean \overline{x} is calculated and a tally mark is placed into one of 50 classes.

The other five figures accompanying the probability distribution show the experiment being repeated for different sample sizes, *n*. In each case, it is clear that the sample means follow a normal distribution and they target the population mean. (Observe that the center of each histogram is very close to x = 20.3873.)

Random Probability Distribution — with $\mu = 20.3873$ and $\sigma = 12.0106$

n = 2

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Sample means (\overline{x}) tend to target population means (μ) , and this is easily seen with repeated sampling.

You don't need to repeatedly sample the population thousands of times to see the result of the Central Limit Theorem.

The animation here simulates the repeated random sampling, except the vertical scaling is not fixed constant. The blue curve in each figure represents a *rough approximation* of the outline of each histogram.

Notice that larger sample sizes approximate the normal distribution better than smaller sample sizes do. n = 2

^{*} Recall that there is a separate sampling distribution for each different value of the sample size, n.

Notice also that after 10,000 repeated samples were taken, the sample standard deviation for each *n* was placed in a green box inside each figure (right). Recall that the standard deviation is a measure of how spread out the data is along the *x* axis.

Observe that as *n* increases the standard deviation of each histogram decreases (the spread of each distribution is more narrow).

It turns out that multiplying each one of these values of $\sigma_{\overline{x}}$ by \sqrt{n} (for its associated *n*) approximates the true population standard deviation, $\sigma = 12.016$ with 99% accuracy. This comes as a result of the Central Limit Theorem (CLT).

Because of the CLT we can approximate previously unknown values of μ and σ , even if we don't know how the population is distributed. Random Probability Distribution — with $\mu =$ 20.3873 and $\sigma =$ 12.0106

n = 2

(ロ) (四) (三) (三) (三)

* Recall that there is a separate sampling distribution for each different value of the sample size, n.

If we constructed relative frequency histograms while conducting the repeated sampling, then we could try to approximate the *actual* sampling (probability) distribution of sample means associated with each different value of *n* shown here.

This animation shows some relative frequency histograms from the experiment. The blue curve in each figure represents each actual probability density function^{*}—which itself follows a normal probability distribution. This comes as a result of the Central Limit Theorem (CLT).

We will study applications of this powerful theorem in Chapters 6, 7, 8 and 9 and 10.

Random Probability Distribution — with $\mu=$ 20.3873 and $\sigma=$ 12.01	06
---	----

^{*} Recall that there is a separate sampling distribution for each different value of the sample size, n.

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Concept

I invite you to make your own probability distribution and try the repeated sampling to see the CLT in action. The online statbook has a pretty cool applet that lets you do this with ease. Check it out if you have time:

http://onlinestatbook.com/2/sampling_distributions/clt_demo.html

click here to access the classroom worksheet

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