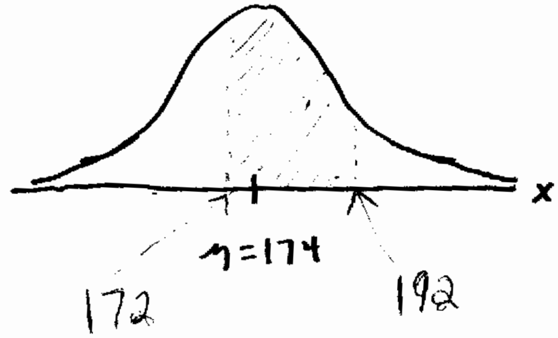
(1) $P(172 < X < 192) =$



$\mu = 174$

$\sigma = 20$

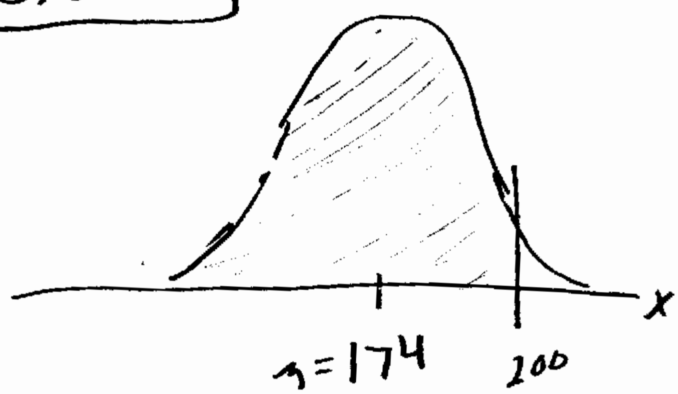
X = a continuous, normally distributed random variable

$= \text{normal Cdf}(a, b, \mu, \sigma)$

$= \text{normalCDF}(172, 192, 174, 20)$

$\approx \boxed{0.3558}$

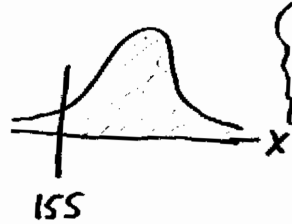
(2) $P(X < 200) =$



$= \text{normal Cdf}(-10^9, 200, 174, 20)$

$\approx \boxed{0.9032}$

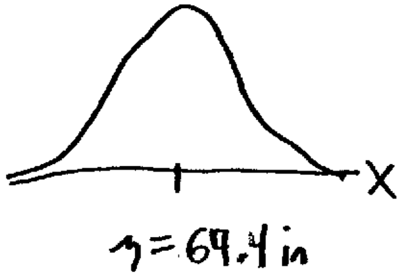
(3) $P(X > 155) =$



$= \text{normalCDF}(155, 10^9, 174, 20)$

$\approx \boxed{0.8289}$

(4) $\mu = 69.4$ in. $\sigma = 2.9$ in. $\Bigg\}$ X = the continuous random variable representing U.S. men's heights



, (U.S. men's heights) avg = 69.4 in. St. dev = 2.9 in.

Since x is a normally distributed, continuous random variable, if we had the entire list of all heights for U.S. men, and if we graphed that list as a relative frequency histogram, that histogram would represent the probability distribution of x. And the graph of the distribution would be bell-shaped (mound-shaped).

Also, we can use a smooth curve to sketch the probability distribution of x.

(a) find $P(x < 66)$

(b) find $P(66 < x < 72)$

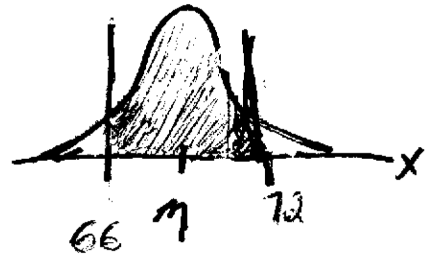
(c) find $P(x > 72)$

(d) Are any events unusual? Yes, but only if their probabilities are less than or equal to 5%.

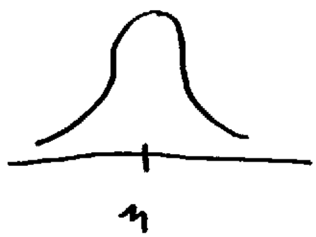
(4a) $P(x < 66) =$ 

$= \text{normalcdf}(-10^9, 66, 69.4, 2.9)$

$= \boxed{0.1205}$

(4B) $P(66 < x < 72) =$ 

$= \text{normalcdf}(66, 72, 69.4, 2.9) = \boxed{0.6945}$

(4c) $P(x > 72) =$ 

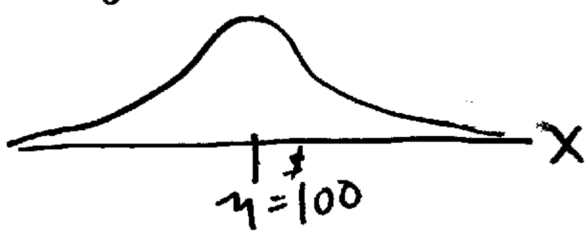
$= \text{normalcdf}(72, 10^9, 69.4, 2.9) = \boxed{0.1850}$

(4d) None of the events are unusual, since their probabilities are not less than 5%

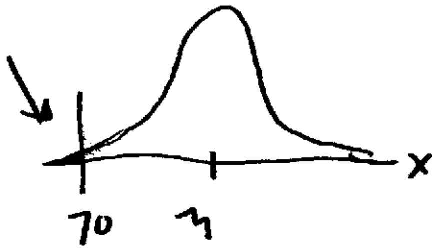
(5) X = the continuous random variable representing the list of monthly utility bills in a city.

$\mu = \$100$

$\sigma = \$12$



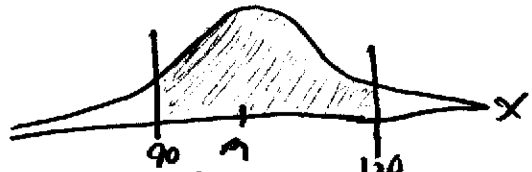
(5a) $P(x<70) =$



0.62%

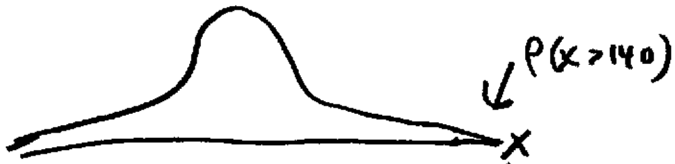
$= \text{normalcdf}(-10^9, 70, 100, 12) = \boxed{0.0062}$

(5b) $P(90 < x < 120)$



$= \text{normalcdf}(90, 120, 100, 12) = \boxed{0.7499}$

(5c) $P(x > 140) =$



$= \text{normalcdf}(140, 10^9, 100, 12)$

$= 4.29 \text{ E } -4$

0.0429%

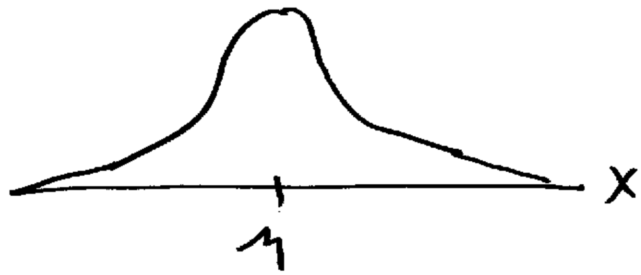
$= 4.29 \times 10^{-4} = \boxed{0.000429}$

(5d) 5a and 5c are unusual

It would be unusual to
get a utility bill less than \$70,
and it would be unusual to get a ~~utility~~
utility bill over \$140, since both
probabilities [$P(x<70)$ and $P(x>140)$]
are both less than or equal to 5%.

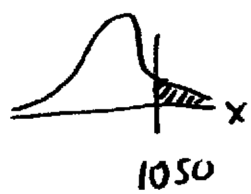
(6) X = the continuous, normal random variable representing a mortgage payment (in dollars) in the U.S. (including principle and interest)

$$\boxed{\begin{aligned} \mu &= \$982.^{00} \\ \sigma &= \$180.^{00} \end{aligned}}$$



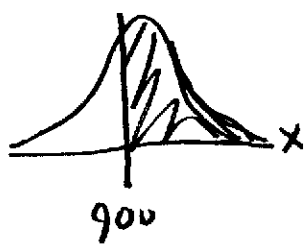
(a)

$P(x \geq 1050) = \text{normalcdf}(1050, 10^9, 982, 180)$

$=$ 

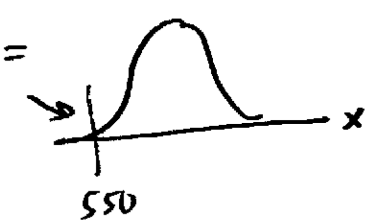
$= \boxed{0.3528}$

(b) $P(x > 900) = \text{normalcdf}(900, 10^9, 982, 180)$

$=$ 

$= \boxed{0.6756}$

(c) $P(x \leq 550) = \text{normalcdf}(-10^9, 550, 982, 180)$

$=$ 

$= \boxed{0.0088}$

↑ 0.88%

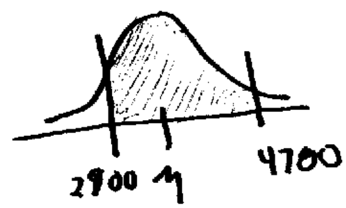
(7)

X = birth weights of full-term babies

μ = avg. wt. = 3500 g

σ = st dev of wt. = 600 g

$P(2900 < X < 4700) = \text{normalcdf}(2900, 4700, 3500, 600)$

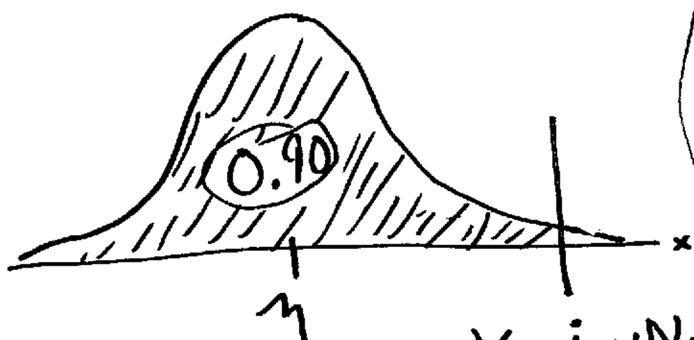
$=$ 

$= \boxed{0.8186}$

(8) $P(X > 4800) = \text{normalcdf}(4800, 10^9, 3500, 600)$

$= \boxed{0.0151}$

(9)



90% of birth weights of full-term babies are $\leq$ 4,269 g

$X = \text{invNorm}(\text{percentile}, \mu, \sigma)$

$= \text{invNorm}(0.90, 3500, 600)$

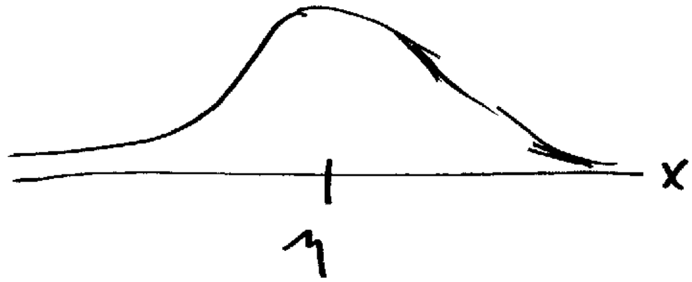
$= \boxed{4269 \text{ grams}}$ 9 lbs, 8 oz

9 lb, 8.5 oz

(10) X = the continuous random variable representing heights of women in the U.S. (ages 20-29)

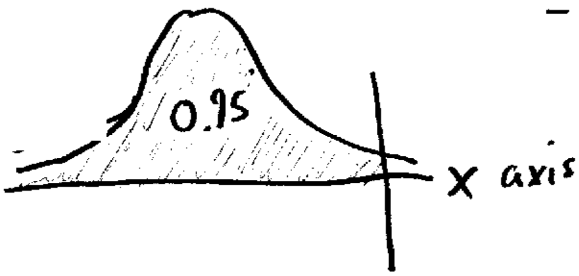
$\mu = 64.2$ in.

$\sigma = 2.9$ in.



use $\boxed{\text{invNorm}(\text{percentile}, \mu, \sigma)}$

(a)

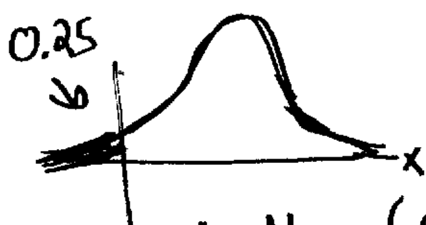


$X = \text{invNorm}(0.95, 64.2, 2.9)$

$= 68.97 = \boxed{69.0 \text{ inches}}$

95% of U.S. women ages 20-29 have a height ≤ 69 inches $\boxed{5 \text{ ft}, 9 \text{ in}}$

(b)



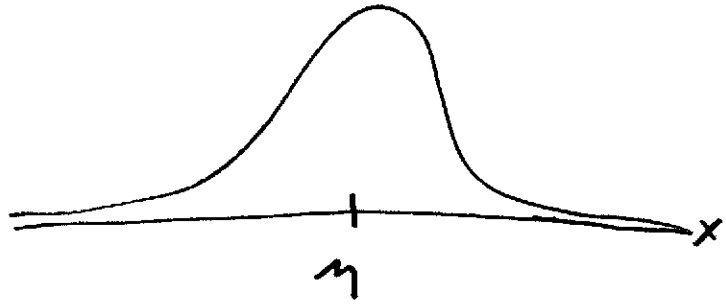
$x = \text{invNorm}(0.25, 64.2, 2.9) = \boxed{62.2 \text{ inches}}$

25% of U.S. women ages 20-29 have a height ≤ 62.2 in $\boxed{5 \text{ft.}, 2 \text{in.}}$

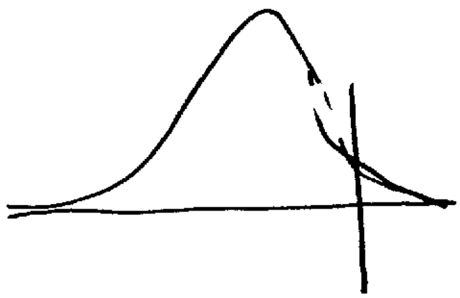
(11) X = the continuous random variable representing the time spent (in days)

$\mu = 1674$ days

$\sigma = 212.5$ days



(a)



$x = \text{invNorm}(\text{percentile}, \mu, \sigma)$

$= \text{invNorm}(0.80, 1674, 212.5)$

$= \boxed{1852.8 \text{ days}}$

Conclusion:
80%
of persons age 35-49 who need a kidney transplant wait 1852.8 days or less.

(b)

$x = \text{invNorm}(0.25, 1674, 212.5)$

$= \boxed{1530.7 \text{ days}}$

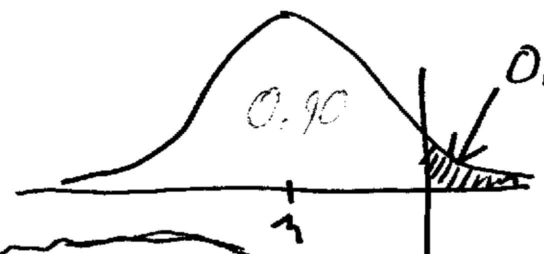
25% of patients wait 1530.7 days or less

(12) X = per capita (yearly) consumption amounts (in pounds) of fresh bananas for the U.S.

$\mu = 10.4$ lbs.

$\sigma = 3$ lbs.

(a)



"percentile" = the area left of x

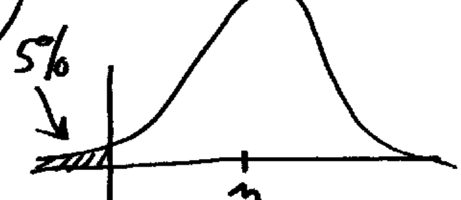
$X = \text{invNorm}(\text{percentile}, \mu, \sigma)$

$= \text{invNorm}(0.90,\ 10.4,\ 3)$

$= \boxed{14.24 \text{ lbs.}}$

90% of U.S. people consume 14.24 pounds of bananas per year

(b)



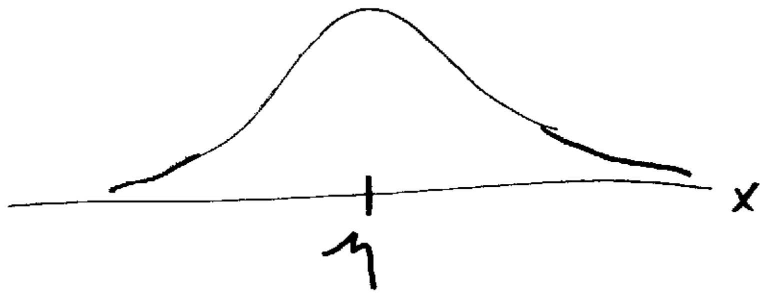
$X = \text{invNorm}(0.05,\ 10.4,\ 3) = \boxed{5.47 \text{ lbs.}}$

5% (or less) of americans consume 5.47 lbs per year.

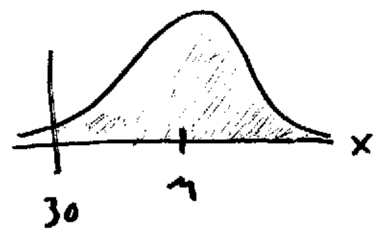
(13) X = the amount of time (in minutes) spent by a statistical consultant at a first meeting

$\eta = 60$ min.

$\sigma = 10$ min



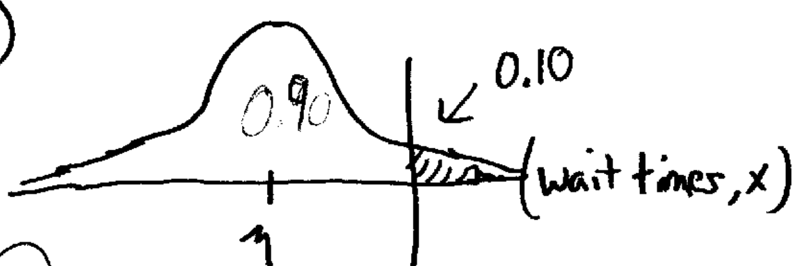
(a) find $P(x > 30) =$



$= \text{normalCdf}(30, 10^9, 60, 10)$

$= \boxed{0.9987}$

(b)



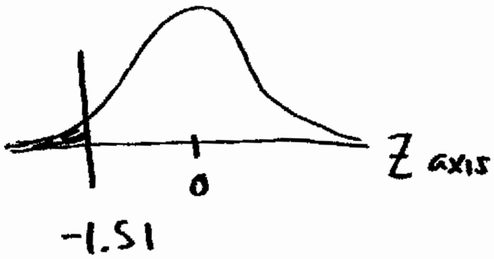
$X = \text{invNorm}(\text{percentile}, \eta, \sigma)$

$= \text{invNorm}(0.90, 60, 10)$

$= \boxed{73 \text{ min}}$ 1 hr, 13 min

90% of wait times are 73 min or less

14



$P(z \le -1.51)$

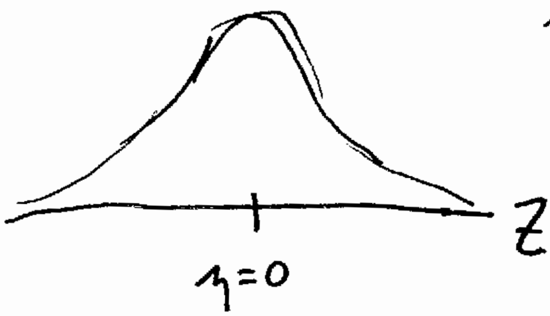
$= \text{normalcdf}(-10^9, 1.51, 0, 1)$

$= \boxed{\cancel{0.9348}}$

= 0.0655

The standard normal distribution is centered at $\eta = 0$ (the origin) with st. dev. = 1.

15

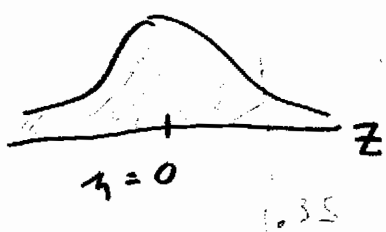


$P(z \le 2.37)$

$= \text{normalcdf}(-10^9, 2.37, 0, 1)$

$= \boxed{0.9911}$

16 $P(z < 1.35) =$

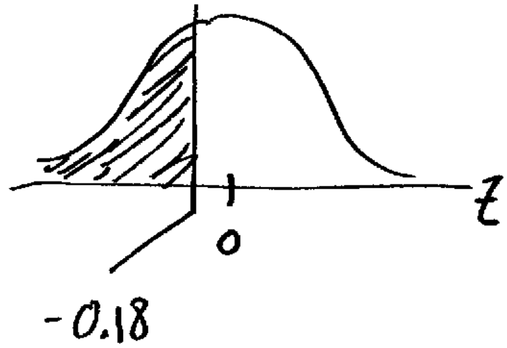


$= \text{normalcdf}(-10^9, 1.35, 0, 1)$

$= \boxed{0.9115}$

(17) $P(z \le 1.35) = P(z < 1.35) = \boxed{0.9115}$

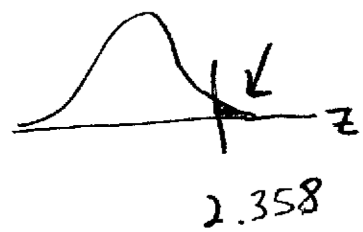
(18) $P(z < -0.18) =$



$= \text{normalCdf}(-10^9, -0.18, 0, 1)$

$= \boxed{0.4286}$

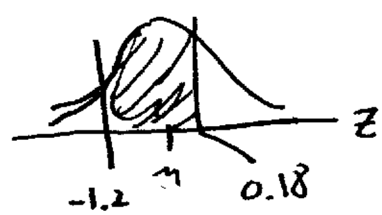
(19) $P(z > 2.358) =$



$= \text{normalcdf}(2.358, 10^9, 0, 1)$

$= \boxed{0.0092}$

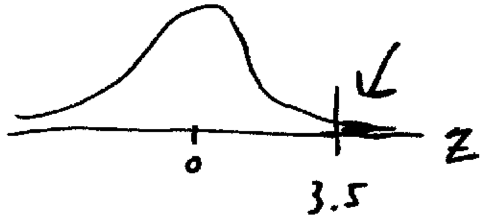
(20) $P(-1.2 < z < 0.18) =$



$= \text{normalCdf}(-1.2, 0.18, 0, 1)$

$= \boxed{0.4564}$

(21) $P(z \geq 3.5) =$

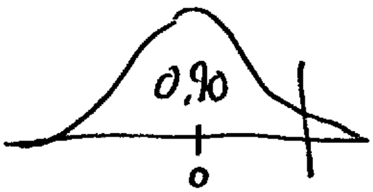


$= \text{normalcdf}(3.5,\ 10^9,\ 0,\ 1)$

$= 2.327 \times 10^{-4}$

$= \boxed{0.0002}$

(22)

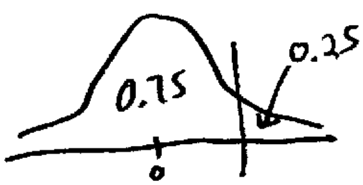


$z = \text{invNorm}(\text{percentile},\ \mu,\ \sigma)$

$= \text{invNorm}(0.90,\ 0,\ 1)$

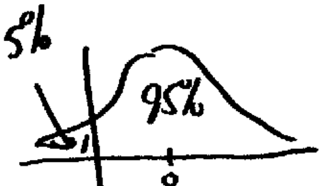
$= \boxed{1.28}$

(23)



$z = \text{invNorm}(0.75,\ 0,\ 1) = \boxed{0.67}$

(24)



$z = \text{invNorm}(0.05,\ 0,1) = \boxed{-1.645}$