Math 160
Professor Busken
Measures of Relative Standing          Name: _Key_____

1. (# 27 Practice Test) The systolic blood pressure of 18-year-old women is normally distributed with a mean of 120 mmHg and a standard deviation of 12 mmHg. What percentage of 18-year-old women have a systolic blood pressure between 96 mmHg and 144 mmHg?

(A) 95%      B) 99.7%      C) 68%      D) 99.99%

$\mu = 120$
$\sigma = 12$

$68\% \begin{cases} \mu + \sigma = 120-12 = 132 \\ \mu - \sigma = 120-12 = 108 \end{cases}$

$95\% \begin{cases} \mu - 2\sigma = 120 - 24 = 96 \\ \mu + 2\sigma = 120 + 24 = 144 \end{cases}$

The empirical rule tells us that 95% of the data is within 2 standard deviations from the mean.

2. (#28 Practice Test) The heights of the adults in one town have a mean of 66.8 inches and a standard deviation of 3.5 inches. What can you conclude from Chebyshev's theorem about the percentage of adults in the town whose heights are between 59.8 and 73.8 inches?

(A) The percentage is at least 75%      B) The percentage is at least 95
C) The percentage is at most 75%        D) The percentage is at most 95

$\mu = 66.8$ in
$\sigma = 3.5$ in

$\mu + \sigma = 66.8 + 3.5 = 70.3$

$\mu - \sigma = 66.8 - 3.5 = 63.3$

$K=2 \begin{cases} \mu + 2\sigma = 66.8 + 2 \cdot 3.5 = 70.3 \\ \mu - 2\sigma = 59.8 \end{cases}$

3. (#26 Practice Test) Use the range rule of thumb to estimate the standard deviation. Round results to the nearest tenth. 26) The heights in feet of people who work in an office are as follows.

6.0   5.5   5.9   5.4   5.8   5.6   5.7   6.2   5.6   5.6

A) 0.5      B) 0.1      C) 1.2      (D) 0.2

$s \approx \dfrac{6.2 - 5.4}{4} = 0.2$

4. Environmental scientists measured the greenhouse gas emissions of a sample of cars. The amounts listed below are in tons (per year), expressed as CO2 equivalents. Is the value of 9.3 tons unusual?

$$7.2 \quad 7.1 \quad 7.4 \quad 7.9 \quad 6.5 \quad 7.2 \quad 8.2 \quad 9.3$$

max usual value = mean + 2·(st.dev)

$$= 7.6 + 2·(0.85857)$$

$$\approx 9.317$$

5. (#31 Practice Test) Find the z-score corresponding to the given value and use the z-score to determine whether the value is unusual. A test score of 83.0 on a test having a mean of 66 and a standard deviation of 10.

A) -1.7; not unusual        B) 1.7; not unusual

C) 1.7; unusual             D) 17; unusual

$$Z = \frac{X - \bar{X}}{S} = \frac{83 - 66}{10} = \frac{17}{10} = 1.7 \quad \text{and } 1.7 \text{ is}$$

in the interval [-2,2], so the test score of 83 is usual.

max usual value = $\bar{X}$ + 2S = 66 + 2·(10) = 86

Anything above 86 would have been considered unusual.

6. Find the percentile associated with the data value: 53, if the data set is:

$$53 \quad 45 \quad 39 \quad 69 \quad 66 \quad 72 \quad 44.$$

See the Ch3 slides

7. Consider again the sample data (below) measuring space shuttle flight duration times (in hours).

$$0 \quad 73 \quad 95 \quad 165 \quad 191 \quad 192 \quad 221 \quad 235 \quad 235 \quad 244 \quad 259 \quad 262 \quad 331 \quad 376 \quad 381$$

- What flight duration time is associated with the 42nd percentile (denoted as $P_{42}$)?
- What flight duration time is associated with the 80th percentile (denoted as $P_{80}$)?
- Construct a box and whisker graph using the given data.
- Construct a modified box and whisker graph using the given data.

Ch3 Slides