Week 2 HW Solutions (even only)

2.3.6. Approximately 10% of the people in the sample have Group B blood. That would mean that about 50 people in the sample have Group B.

98.6 is close to the mean, but slightly high. This is not bell shaped, looks slightly skewed left (negatively skewed).

2.3.16. Stems (ones) | Leaves (tenths)
---|---
1  | 26
2  | 5899
3  | 26
4  | 15
5  | 1158
6  | 114588
There appears to be no relationship between White and Red Blood Cell Count.
2.4.2. The mean will not be a good estimate because we don't know what proportion of Americans eat which cereal.

The mean is calculated as follows:

\[ \bar{X} = \frac{\sum X_i}{n} = \frac{1}{16} \left[ 1.03 + 2.47 + \ldots + 4.5 + 4.3 \right] = 2.95 \]

The median is calculated as follows:

First sort the data

1.03, 0.73, 0.93, 1.13, 1.39, 1.73, 2.03, 2.39, 3.03, 3.43, 4.43, 4.45, 4.47, 4.47, 4.48

Then find the middle value. In this case, there is a tie between 2.3 and 2.39, so we take the average of the two:

\[ \hat{X} = \frac{2.3 + 2.39}{2} = 2.345 \]

The mode is the value or values that appear most often. In this case, there are three:

\[ \{ 2.3, 4.3, 4.7 \} \]

The midrange is the average of the max and min, so we calculate it as follows:

\[ \frac{1.03 + 4.8}{2} = 2.95 \]
2.4.6. Less work will be shown. A full workup of 2.4.2 is available, and this problem is nearly identical.

\[ \bar{x} = \frac{8.88}{11} = .807 \]
\[ x = .841 \]
mode = .841
midrange = \[ \frac{.64 + .92}{2} = .78 \]

2.4.12 Since the data can be recovered from the stem & leaf plot, we proceed as above.

\[ \bar{x} = \frac{129.2}{20} = 6.46 \] In exercise 11, the control gp. mean was 41.95
\[ \bar{x} = \frac{6.8 + 6.9}{2} = 6.85 \] In exercise 11, the control gp. median was 5

The modes are 6.9. In 11, 11, the mode was 5.5 and 7.3

The midrange is 5.6, 11 11, the midrange was 4.

All measures of center for the fertilizer and irrigation group are larger than the measures of center for the control group.
2.5.4. States are not trying to reduce the standard deviation of BAC, they are trying to lower the mean and/or median.

For range, we first calculate:

\[\text{Range} = 0.29 - 0.12 = 0.17\]

Variance: \[\sigma^2 = \frac{\sum (x_i - \bar{x})^2}{n-1}\]

\[= \frac{15 \cdot [0.27^2 + 0.17^2 + ... + 0.18^2] - (0.27 + 0.17 + ... + 0.18)^2}{15 \cdot (15-1)}\]

\[= 15 \cdot 0.5631 - 2.81^2\]

\[\approx 0.002621\]

Standard deviation:

\[s = \sqrt{s^2} = \sqrt{0.002621} = 0.051\]

2.5.8. Our measurements of variation can be computed, but since it is nominal data, they are meaningless.

Range: \[3\]

\[s^2 = 0.86\]

\[s = \sqrt{s^2} = 0.927\]
2.5.11

\[ \text{Range} = 5 \]
\[ s^2 = 2.019 \]
\[ s = \sqrt{s^2} = 1.42 \]
control group

\[ \text{Range} = 5.6 \]
\[ s^2 = 3.181 \]
\[ s = 1.78 \]
Treatment Group

The treatment group has more variation.

\[ 2.5.2.3 \]

\[ \bar{x}_{\text{men}} = \frac{71 + 66 + 72 + 69 + 68 + 69}{6} = 69.17 \]

\[ s_{\text{men}} = 2.14 \]

Coef. of var \[ \bar{x}_{\text{men}} = \frac{s_{\text{men}}}{\bar{x}_{\text{men}}} = 0.0309 \] which we usually denote as a percent, so 3.09%

\[ \bar{x}_{\text{cuckoo}} = 22.14 \]

\[ s_{\text{cuckoo}} = 1.13 \]

\[ \text{C.V.} = \frac{s_{\text{cuckoo}}}{\bar{x}_{\text{cuckoo}}} = 0.051 \text{ or } 5.1\% \]

The relative variation of cuckoos is higher than the relative variation of heights of men.
2.6.2. \( M = 176 \) and \( \sigma = 7 \)

a) \( Z_{\text{percent}} = \frac{X - \bar{M}}{\sigma} = \frac{152 - 176}{7} \approx -3.43 \)

b) \( Z_{\text{shag}} = \frac{X - \bar{M}}{\sigma} = \frac{216 - 176}{7} \approx 5.71 \)

2.6.41. \( M = 98.2 \), \( \sigma = 62 \)

a) \( Z = \frac{100 - 98.2}{62} = 2.9 \)

b) \( Z = \frac{96.96 - 98.2}{62} = -2 \)

c) \( Z = \frac{98.2 - 98.2}{62} = 0 \)

2.6.10. \( a) \) \( Z = \frac{144 - 128}{34} \approx 0.47 \)

b) \( Z = \frac{90 - 66}{18} \approx 0.22 \)

c) \( Z = \frac{18 - 15}{5} = 0.6 \)

2.6.16. \( Q_3 = P_{75} \), so we do the following

\[ L = \frac{75 \times 40 = 30}{100} = 0.40 = 30 \]. Since this is a whole number, the 75th percentile is the average of the 30th and 31st numbers, so \( Q_3 = \frac{250 + 253}{2} = 251.5 \)

2.6.20. \( P_{21} \) \( L = \frac{21 \times 610 = 8.4}{100} = 8.4 \), so we take the 9th point. \( P_{21} = 48 \)