Section 2.5: Measures of Relative Position

Adult Female Heights (cm)

\{148.0^*, 152.2^*, 155.2^*, 152.7^*, 155.1^*, 156.8^*, 158.4^*, 158.3^*, 156.2^*, 158.6, 159.9, 164.2, 157.9, 159.8, 160.9, 162.3, 158.0, 159.8, 156.9, 162.4, 160.2, 166.9, 167.2, 167.6, 164.0, 170.4, 175.9, 176.4, 184.1\}

Percentile \( \rightarrow \) A percentage ranking.

\[ \text{The percentile of a value, } X = \frac{\text{number of values less than } X}{\text{sample size}} \times 100 \text{ (Round off).} \]

Ex: Compute the percentile for \( X = 157.9 \).

\[ \text{Percentile} = \frac{9}{30} \times 100 = 30^\text{th} \text{ percentile} \]

Z-score or Standard Score

\( \Rightarrow \) The z-score of a value, \( X \), is the number of standard deviations that \( X \) lies from the mean. (This is negative when \( X \) is below the mean).

\[ Z = \frac{X - \mu}{\sigma} \]

Ex: Adult Female Heights. \( \bar{X} = 161.39 \text{ cm, } S = 7.73 \text{ cm.} \)

Z-score of 167.6 = \( X \)

\[ Z = \frac{X - \bar{X}}{S} = \frac{167.6 - 161.39}{7.73} = 0.80 \]

So, \( X = 167.6 \) is 0.80 sample std. dev's above the sample mean. \( \Rightarrow \) Not unusual.