2.11: Formula Review

2.3 Measures of the Location of the Data

$$i=\left(\frac{k}{100}\right)(n+1) \tag{2.11.1}$$

where $i=$ the ranking or position of a data value,
$k=$ the kth percentile,
$n=$ total number of data.

Expression for finding the percentile of a data value: $\left(\frac{x+0.5y}{n}\right)(100)$ where $x=$ the number of values counting from the bottom of the data list up to but not including the data value for which you want to find the percentile,
$y=$ the number of data values equal to the data value for which you want to find the percentile,
$n=$ total number of data

2.4 Measures of the Center of the Data

$\mu=\frac{\sum fm}{\sum f}$ Where $f=$ interval frequencies and $m=$ interval midpoints.

The arithmetic mean for a sample (denoted by $\bar{x}$) is $\bar{x}=\frac{\text{Sum of all values in the sample}}{\text{Number of values in the sample}}$

The arithmetic mean for a population (denoted by μ) is $\mu=\frac{\text{Sum of all values in the population}}{\text{Number of values in the population}}$

2.6 Geometric Mean

The Geometric Mean: $\tilde{x}=\left(\prod_{i=1}^{n} x_i\right)^{\frac{1}{n}}=\sqrt[n]{x_1\cdot x_2\cdots x_n}=\left(x_1\cdot x_2\cdots x_n\right)^{\frac{1}{n}}$

2.7 Skewness and the Mean, Median, and Mode

Formula for skewness: $a_3=\sum\frac{(x_i-\bar{x})^3}{ns^3}$
Formula for Coefficient of Variation: $CV=\frac{s}{\bar{x}}\cdot 100$ conditioned upon $\bar{x}\neq 0$

2.8 Measures of the Spread of the Data

$s_x=\sqrt{\frac{\sum fm^2}{n}-\bar{x}^2}$ where $\begin{array}{l} s_x = \text{ sample standard deviation} \\ \bar{x} = \text{ sample mean} \end{array}$
$\bar{x}=$ sample mean

Formulas for Sample Standard Deviation $s=\sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$ or $s=\sqrt{\frac{\Sigma f(x-\bar{x})^2}{n-1}}$ or $s=\sqrt{\frac{\left(\sum_{i=1}^{n} x^2\right)-n\bar{x}^2}{n-1}}$ For the sample standard deviation, the denominator is $\boldsymbol{n-1}$, that is the sample size - 1 .

Formulas for Population Standard Deviation $\sigma=\sqrt{\frac{\Sigma(x-\mu)^2}{N}}$ or $\sigma=\sqrt{\frac{\Sigma f(x-\mu)^2}{N}}$ or $\sigma=\sqrt{\frac{\sum_{i=1}^{N} x_i^2}{N}-\mu^2 \text{ For}}$ the population standard deviation, the denominator is N, the number of items in the population.