SUMMARY OF STATISTICS FORMULAS

THE MEAN

Population: $\mu = \dfrac{\Sigma X}{N}$ Sample: $M = \dfrac{\Sigma X}{n}$

SUM OF SQUARES

Definitional: $SS = \Sigma(X - \mu)^2$

Computational: $SS = \Sigma X^2 - \dfrac{(\Sigma X)^2}{N}$

VARIANCE

Population: $\sigma^2 = \dfrac{SS}{N}$ Sample: $s^2 = \dfrac{SS}{n-1}$

STANDARD DEVIATION

Population: $\sigma = \sqrt{\dfrac{SS}{N}}$ Sample: $s = \sqrt{\dfrac{SS}{n-1}}$

z-SCORE (FOR LOCATING AN *X* VALUE)

$$z = \frac{X - \mu}{\sigma}$$

z-SCORE (FOR LOCATING A SAMPLE MEAN)

$$z = \frac{M - \mu}{\sigma_M} \quad \text{where } \sigma_M = \frac{\sigma}{\sqrt{n}} = \sqrt{\frac{\sigma^2}{n}}$$

t STATISTIC (SINGLE SAMPLE)

$$t = \frac{M - \mu}{s_M} \quad \text{where } s_M = \sqrt{\frac{s^2}{n}}$$

t STATISTIC (INDEPENDENT MEASURES)

$$t = \frac{(M_1 - M_2) - (\mu_1 - \mu_2)}{s_{(M_1 - M_2)}}$$

$$\text{where } s_{(M_1 - M_2)} = \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}} \quad \text{and} \quad s_p^2 = \frac{SS_1 + SS_2}{df_1 + df_2}$$

t STATISTIC (RELATED SAMPLES)

$$t = \frac{M_D - \mu_D}{s_{M_D}} \quad \text{where } s_{M_D} = \sqrt{\frac{s^2}{n}}$$

ESTIMATION

t Statistic (Single Sample)

$$\mu = M \pm t s_M$$

t Statistic (Independent Measures)

$$\mu_1 - \mu_2 = M_1 - M_2 \pm t s_{(M_1 - M_2)}$$

t Statistic (Related Samples)

$$\mu_D = M_D \pm t s_{M_D}$$

MEASURES OF EFFECT SIZE

$$\text{Cohen's } d = \frac{\text{mean difference}}{\text{standard deviation}}$$

r^2 and η^2 (Percentage of Variance Accounted For)

$$r^2 = \frac{t^2}{t^2 + df} \quad \text{(for } t \text{ tests)}$$

$$\eta^2 = \frac{SS_{\text{between treatments}}}{SS_{\text{total}}} \quad \text{(for Analysis of Variance)}$$

PEARSON CORRELATION

$$r = \frac{SP}{\sqrt{SS_X SS_Y}}$$

$$\text{where } SP = \Sigma(X - M_X)(Y - M_Y) = \Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{n}$$

SPEARMAN CORRELATION

$$r_s = 1 - \frac{6\Sigma D^2}{n(n^2 - 1)}$$