THE MEAN

Population: $\mu = \frac{\sum X}{N}$ Sample: $M = \frac{\sum X}{n}$

SUM OF SQUARES

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

Computational: SS = $\sum X^2 - \frac{(\sum X)^2}{N}$

VARIANCE

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

STANDARD DEVIATION

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

z-SCORE (FOR LOCATING AN X VALUE)

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

z-SCORE (FOR LOCATING A SAMPLE MEAN)

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

t STATISTIC (SINGLE SAMPLE)

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

t STATISTIC (INDEPENDENT MEASURES)

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

where $s_{(M_1 - M_2)} = \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$ and

$$s_p^2 = \frac{SS_1 + SS_2}{df_1 + df_2}$$

t STATISTC (RELATED SAMPLES)

$t = \frac{M_D - \mu_D}{s_{M_D}}$ 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

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

$$r^2 = \frac{t^2}{t^2 + df}$$