Brief Summary of Statistical Notation and Formulas

CENTRAL TENDENCY (CHAPTER 3)

$\mu = \frac{\Sigma x}{N}$ (Population mean)

$M = \frac{\Sigma x}{n}$ (Sample mean)

VARIABILITY (CHAPTER 4)

$\sigma^2 = \frac{SS}{N}$ (Population variance)

$\sigma = \sqrt{\sigma^2} = \sqrt{\frac{SS}{N}}$ (Population standard deviation)

$s^2 = \frac{SS}{n-1} = \frac{SS}{df}$ (Sample variance)

$s = \sqrt{s^2} = \sqrt{\frac{SS}{n-1}} = \sqrt{\frac{SS}{df}}$ (Sample standard deviation)

z TRANSFORMATIONS AND STANDARD ERROR (CHAPTERS 6 AND 7)

$z = \frac{x-\mu}{\sigma}$ (*z* transformation for a population of scores)

$z = \frac{x-M}{SD}$ (*z* transformation for a sample of scores)

$\sigma_M = \sqrt{\frac{\sigma^2}{n}} = \frac{\sigma}{\sqrt{n}}$ (Standard error of the mean)

THE *z* TEST (CHAPTER 8)

$z_{obt} = \frac{M-\mu}{\sigma_M}$ (Test statistic for a one-sample *z* test)

$d = \frac{M-\mu}{\sigma}$ (Cohen's *d* effect size measure for the *z* test)

THE *t* TESTS (CHAPTERS 9 AND 10)

One-Sample *t*

$t_{obt} = \frac{M-\mu}{s_M}$ (Test statistic for the one-sample *t* test)

Two-Independent-Sample *t*

$t_{obt} = \frac{(M_1-M_2)-(\mu_1-\mu_2)}{s_{M_1-M_2}}$ (Test statistic for the two-independent-sample *t* test)

Related-Samples *t*

$t_{obt} = \frac{M_D-\mu_D}{s_{MD}}$ (Test statistic for the related-samples *t* test)

Effect Size

$d = \frac{M-\mu}{SD}$ (Estimated Cohen's *d* for one-sample *t* test)

$\frac{M_1-M_2}{\sqrt{s_p^2}}$ (Estimated Cohen's *d* for two-independent-sample *t* test)

$d = \frac{M_D}{s_D}$ (Estimated Cohen's *d* for related-samples *t* test)

ONE-WAY BETWEEN-SUBJECTS ANALYSIS OF VARIANCE (CHAPTER 12)

Between-Subjects Design

$F_{obt} = \frac{MS_{BG}}{MS_E}$ (Test statistic for the one-way between-subjects ANOVA)

Effect Size (Between-Subjects Design)

$R^2 = \eta^2 = \frac{SS_{BG}}{SS_T}$ (Eta-squared estimate for proportion of variance)

$\omega^2 = \frac{SS_{BG} - df_{BG}(MS_E)}{SS_T + MS_E}$ (Omega-squared estimate for proportion of variance)

ONE-WAY WITHIN-SUBJECTS ANALYSIS OF VARIANCE (CHAPTER 13)

Within-Subjects Design

$F_{obt} = \frac{MS_{BG}}{MS_E}$ (Test statistic for the one-way within-subjects ANOVA)

Effect Size (Within-Subjects Design)

$\eta_P^2 = \frac{SS_{BG}}{SS_T - SS_{BP}}$ (Partial eta-squared for proportion of variance)

$\omega_P^2 = \frac{SS_{BG} - df_{BG}(MS_E)}{(SS_T - SS_{BP}) + MS_E}$ (Partial omega-squared for proportion of variance)

TWO FACTOR ANALYSIS OF VARIANCE (CHAPTER 14)

$F_A = \frac{MS_A}{MS_E}$ (Test statistic for the main effect on factor A)

$F_B = \frac{MS_B}{MS_E}$ (Test statistic for the main effect on factor B)

$F_{A \times B} = \frac{MS_{A \times B}}{MS_E}$ (Test statistic for the A × B interaction)

CORRELATION AND REGRESSION (CHAPTERS 15 AND 16)

Correlation Coefficient

$r = \frac{SS_{XY}}{\sqrt{SS_X SS_Y}}$ (Pearson correlation coefficient)

Analysis of Regression

$F_{obt} = \frac{MS_{regression}}{MS_{residual}}$ (Test statistic for analysis of regression and analysis of multiple regression)

CHI-SQUARE TESTS (CHAPTER 17)

One-Way and Two-Way Chi-Square Tests

$\chi^2_{obt} = \Sigma \frac{(f_o - f_e)^2}{f_e}$ (Test statistic for the chi-square goodness-of-fit test and the chi-square test for independence)

Effect Size (Test for Independence)

$V = \sqrt{\frac{\chi^2}{n \times df_{smaller}}}$ (Cramer's *V* effect size estimate)

TESTS FOR ORDINAL DATA (CHAPTER 18)

The Sign Test

$z = \frac{x - np}{\sqrt{np(1-p)}}$ (Test statistic for the normal approximation for the sign test)

Wilcoxon Signed-Ranks *T* Test

$z = \frac{T - \mu_T}{\sigma_T}$ (Test statistic for the normal approximation of the Wilcoxon *T*)

Mann-Whitney *U* Test

$z = \frac{U - \mu_U}{\sigma_U}$ (Test statistic for the normal approximation of the Mann-Whitney *U*)

The Kruskal-Wallis *H* Test

$H = \frac{12}{N(N+1)}\left(\Sigma \frac{R^2}{n}\right) - 3(N+1)$ (Test statistic for the Kruskal-Wallis *H* test)

The Friedman Test

$\chi^2_R = \frac{12}{nk(k+1)} \Sigma R^2 - 3n(k+1)$ (Test statistic for the Friedman test)