Psych216: Elementary Statistics

Midterm 3: Review Sheet (Chapters 13 & 14)

Be able to carry out the appropriate ANOVA (Independent Groups or Repeated Measures) for a set of data. Be sure you can compute all the various Sums of squares (SS), variances (MS), and degrees of freedom (df) needed and that you can construct a source table. Be sure that if I provide you with part of the source table you can fill in the missing parts.

For a hypothesis test using ANOVA be able to conduct the test using the 5 step procedure used in class and on the homework assignments and make sure you show all of your work as I've done in class.

Be able to construct a figure graphing the results for a hypothesis test (One-Way RM ANOVA or Independent Measures ANOVA). Be sure you can label the x and y axes appropriately and that you can write a title for the figure.

Be able to carry out the HSD post hoc test procedures to compare treatment means after a significant overall effect (e.g. as determined by the ANOVA).

Be able to identify or list the assumptions of the statistical tests we have used (e.g. the homogeneity of variance assumption is necessary to carry out an independent measures ANOVA).

Know what the F-distribution looks like: e.g. positive, skewed, etc.

Know the various sums of squares and the variances (e.g. $MS_{\text{between treatments}}$ and MS_{within}) and what types of variability they measure. Know how to form F-ratios (e.g. in an independent measures design the F-ratio is: $F = \frac{MS_{between treatments}}{MS_{within treatments}}$) and know when you should expect an F-ratio of 1, for example, and when you should expect an F-ratio greater than 1.

Know the relationship between the t-statistic and the F-statistic.

Know the advantages/disadvantages of the various statistical tests.

Know the relationships between the various sums of squares and degrees of freedom (e.g. $df_{\text{total}} = df_{\text{bet treat}} + df_{\text{within treat}}$).

Know when you should use a post hoc test and when it is unnecessary.

Here are the formulas you will have available on the test:

Formulas

$$z = \frac{x - \mu}{\sigma_x} \qquad \sigma = \sqrt{\frac{SS}{N}} \qquad \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

$$z = \frac{\bar{x} - \mu}{\sigma_{\bar{x}}} \qquad s = \sqrt{\frac{SS}{n-1}} \qquad s_{\bar{x}} = \frac{s}{\sqrt{n}}$$

$$t = \frac{\bar{x} - \mu}{s_{\bar{x}}} \qquad t = \frac{\left(\bar{x}_1 - \bar{x}_2\right) - \left(\mu_1 - \mu_2\right)}{s_{\bar{x}_1 - \bar{x}_2}} \qquad s_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}$$

$$t = \frac{\left(\bar{x}_1 - \bar{x}_2\right) - \left(\mu_1 - \mu_2\right)}{\sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}} \qquad s_p^2 = \frac{df_1 s_1^2 + df_2 s_2^2}{df_1 + df_2} \qquad s_p^2 = \frac{SS_1 + SS_2}{df_1 + df_2}$$

$$t = \frac{\bar{D} - \mu}{s_{\bar{D}}} \qquad SS = \sum D^2 - \frac{\left(\sum D\right)^2}{n} \qquad SS = \sum (x - \bar{x})^2$$

$$SS = \sum x^2 - \frac{\left(\sum x\right)^2}{n} \qquad SS_{Tot} = \sum x^2 - \frac{G^2}{N} \qquad SS_{Betw-treat} = \sum \frac{T^2}{n} - \frac{G^2}{N}$$

$$SS_{Bet\ Subjects} = \sum \frac{p^2}{k} - \frac{G^2}{N} \qquad SS_{within} = \sum SS_{inside\ each\ treatment} \qquad df_{tot} = N - 1$$

$$df_{Bet-Treat} = k - 1 \qquad df_{within} = N - k \qquad df_{bet-Subjects} = n_s - 1$$

$$HSD = q\sqrt{\frac{MS_{error}}{n}} \qquad HSD = q\sqrt{\frac{MS_{within}}{n}}$$