Stats Exam 2 Formula Sheet

Confidence Intervals:

$$CI = \overline{X} \pm t_\alpha \left(\frac{s}{\sqrt{N-1}}\right) \qquad CI = \overline{X} \pm z_\alpha \left(\frac{s}{\sqrt{N-1}}\right)$$

$$CI = \hat{p} \pm z_\alpha \sqrt{\frac{\hat{p}(1-\hat{p})}{N}}$$

Chi-Square:

$$df = (r-1)(c-1) \qquad \chi^2_{obt} = \Sigma \frac{(f_{o_i} - f_{e_i})^2}{f_{e_i}}$$

$$f_{e_i} = \frac{rm_i \cdot cm_i}{N}$$

Cramer's V:

$$V = \sqrt{\frac{\chi^2_{obt}}{N \cdot m}}$$

T test: Independent-Samples, Pooled Variances:

$$df = N_1 + N_2 - 2$$

$$\hat{\sigma}_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{(N_1-1)s_1^2 + (N_2-1)s_2^2}{N_1 + N_2 - 2}} \sqrt{\frac{N_1 + N_2}{N_1 N_2}}$$

$$t_{obt} = \frac{\overline{X}_1 - \overline{X}_2}{\hat{\sigma}_{\bar{x}_1 - \bar{x}_2}}$$

T test: Independent-Samples, Separate Variances:

$$df = \frac{\left(\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}\right)^2}{\left(\frac{s_1^2}{N_1}\right)^2\left(\frac{1}{N_1-1}\right) + \left(\frac{s_2^2}{N_2}\right)^2\left(\frac{1}{N_2-1}\right)}$$

$$\hat{\sigma}_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{s_1^2}{N_1-1} + \frac{s_2^2}{N_2-1}}$$

$$t_{obt} = \frac{\overline{X}_1 - \overline{X}_2}{\hat{\sigma}_{\bar{x}_1 - \bar{x}_2}}$$

T test: Dependent Samples:

$df = N_{pairs} - 1$

$X_D = X_1 - X_2$ $\bar{X}_D$ = mean of X_D $\rightarrow \bar{X}_D = \frac{\Sigma X_D}{N}$

$SD = \sqrt{\frac{\Sigma(X_D - \bar{X}_D)^2}{N_{pairs}-1}}$

$\hat{\sigma}_{\bar{X}_1-\bar{X}_2} = \frac{SD}{\sqrt{N_{pairs}}}$ $t_{obt} = \frac{\bar{X}_D}{\hat{\sigma}_{\bar{X}_1-\bar{X}_2}}$

T test: Proportions:

$\hat{q} = 1 - \hat{p}$ $\hat{p} = \frac{N_1\hat{p}_1 + N_2\hat{p}_2}{N_1 + N_2}$ $\hat{\sigma}_{\hat{p}_1-\hat{p}_2} = \sqrt{\hat{p}\hat{q}}\sqrt{\frac{N_1+N_2}{N_1 N_2}}$

$z_{obt} = \frac{\hat{p}_1 - \hat{p}_2}{\hat{\sigma}_{\hat{p}_1-\hat{p}_2}}$

anova:

$df_B = K - 1$ $df_W = N - K$

* 7-step process:

1) Find the sum of each group (ΣX_K), each group's mean ($\bar{X}_K$), and the grand mean. $\bar{X}_G = \frac{\Sigma_i \Sigma_K X}{N}$

2) Find the sum of each group's squared raw scores.
ΣX_K^2

3) Compute the total Sum of Squares.
$$SS_T = \sum_i \sum_K X^2 - \frac{(\Sigma_i \Sigma_K X)^2}{N}$$

4) Compute the between-group Sum of Squares.
$$SS_B = n_1(\bar{X}_1 - \bar{X}_G)^2 + n_2(\bar{X}_2 - \bar{X}_G)^2 + n_3(\bar{X}_3 - \bar{X}_G)^2$$

do this for each group (may have more than 3)

anova Continued:

5) Compute the within-group Sum of Squares.

$$SS_W = SS_T - SS_B$$

6) Find the Mean Squares.

$$MS_B = \frac{SS_B}{K-1} \qquad MS_W = \frac{SS_W}{N-K}$$

7) Calculate Fobtained.

$$F_{obt} = \frac{MS_B}{MS_W}$$

Omega Squared:

$$\omega^2 = \frac{SS_B - (K-1)MS_W}{MS_W + SS_T}$$

Correlations:

$df = N-2$

no N here (my mistake!)

$$r = \frac{N\Sigma xy - \cancel{N}\Sigma x \Sigma y}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}}$$

$$t_{obt} = r\sqrt{\frac{N-2}{1-r^2}}$$

Coefficient of Determination: r^2

Sign: is r negative or positive?

Magnitude: how large is r? Is it indicating a weak, moderate, strong or very strong relationship?