Exam 4

Hypothesis test proportion

$$z_{obs} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} \qquad \hat{p} = \frac{X}{n}$$

p_0 = null hypothesis p

Hypothesis test difference between proportions

if $H_0: p_1 - p_2 = 0$

$$z_{obs} = \frac{(\hat{p}_1 - \hat{p}_2) - 0}{\sqrt{\hat{p}\hat{q}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

where

$$\hat{p} = \frac{x_1 + x_2}{n_1 + n_2}$$

if $H_0: p_1 - p_2 = D_0$

$$z_{obs} = \frac{(\hat{p}_1 - \hat{p}_2) - D_0}{\sqrt{\frac{\hat{p}_1 \hat{q}_1}{n_1} + \frac{\hat{p}_2 \hat{q}_2}{n_2}}}$$

correlation coefficient

$$r_{xy} = \frac{s_{xy}}{s_x s_y}$$

$$\hat{\beta} = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2}$$

$$\hat{\alpha} = \bar{y} - \hat{\beta}\bar{x}$$

hypothesis test Regression

intercept

$$t_{obs} = \frac{\hat{\beta} - \beta}{\sigma_{\hat{\beta}}}$$

β = null hypothesis value

slope

$$t_{obs} = \frac{\hat{\alpha} - \alpha}{\sigma_{\hat{\alpha}}}$$

for critical value

$$d.f. = n - k$$

k = # of estimated values

Regression coefficient conf. interval

$$\hat{\alpha} \pm t_{\alpha/2}\, \sigma_{\hat{\alpha}} \qquad d.f. = n-k$$

$$\hat{\beta} \pm t_{\alpha/2}\, \sigma_{\hat{\beta}} \qquad d.f. = n-k$$

Goodness of fit

$$R^2 = \frac{ESS}{TSS}$$

OR

$$R^2 = 1 - \frac{RSS}{TSS}$$

Prediction

point estimate

$$\hat{y}_0 = \hat{\alpha} + \hat{\beta} x_0$$

confidence interval

$$\hat{y}_0 \pm t_{\alpha/2}\, s_{\hat{y}_0} \qquad d.f. = n-k$$

where

$$s_{\hat{y}_0} = s_\varepsilon \sqrt{\frac{1}{n} + \frac{(x_0 - \bar{x})^2}{\sum_{i=1}^{n} (x_i - \bar{x})^2}}$$