ECN 102: Analysis of Economics Data

Midterm Formula Sheet – Beauregard

Univariate Data

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \quad s_x^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

$$\bar{x} \pm t^*_{\alpha/2;n-1} \times (s_x/\sqrt{n}) \quad t = \frac{\bar{x} - \mu_0}{s_x/\sqrt{n}}$$

$$ttail(df, t) = P[T > t] \text{ where } T \sim T(df)$$

$$invttail(df, p) \to t^* : P[T > t^*] = p \text{ where } T \sim T(df)$$

Bivariate Data

$$r_{xy} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \times \sum_{i=1}^{n}(y_i - \bar{y})^2}} = \frac{s_{xy}}{s_x \times s_y}$$

$$\hat{y} = b_1 + b_2 x$$

$$b_1 = \bar{y} - b_2\bar{x}$$

$$b_2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2} = r_{xy}\frac{s_y}{s_x}$$

$$TSS = \sum_{i=1}^{n}(y_i - \bar{y})^2 \quad ResSS = \sum_{i=1}^{n}(y_i - \hat{y}_i)^2 \quad ExpSS = \sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2$$

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

$$b_2 \pm t^*_{\alpha/2;n-2} \times s_{b_2} \quad t = \frac{b_2 - \beta_2}{s_{b_2}}$$

$$s_{b_2} = \frac{s_e}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2}} \quad s_e = \sqrt{\frac{1}{n-2}\sum_{i=1}^{n}(y_i - \hat{y}_i)^2}$$