FORMULAS

Bivariate regression models

$E(y) = \alpha + \beta x \qquad \hat{y} = a + bx \qquad r = b(s_x/s_y) \qquad r^2 = (TSS - SSE)/(TSS)$

$$b \pm t(se) \quad t = \frac{b}{se} \quad (df = n-2), \quad se = \frac{s}{\sqrt{\Sigma(x-\overline{x})^2}} = \frac{s}{s_x\sqrt{n-1}} \quad s = \sqrt{\frac{SSE}{(n-2}}$$

$$s = \sqrt{SSE/(n-2)} = \text{Root MSE}$$

Multiple regression models

$E(y) = \alpha + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k \qquad \hat{y} = a + b_1 x_1 + b_2 x_2 + \cdots + b_k x_k$

$R^2 = (TSS - SSE)/(TSS) \qquad TSS = \sum(y-\bar{y})^2 \qquad SSE = \sum(y-\hat{y})^2$

$$F = \frac{R^2/k}{(1-R^2)/[n-(k+1)]} = \frac{\text{MS(regression)}}{\text{MSE}} \qquad df_1 = k,\ df_2 = n-(k+1)$$

$t = b_i/se \quad df = n-(k+1) \qquad b_i \pm t_{\alpha/2}(se)$

Comparing models:

$$F = \frac{(R_c^2 - R_r^2)/df_1}{(1-R_c^2)/df_2}, \ df_1 = \text{no. extra parameters}, df_2 = n-(k+1) \text{ complete model}$$