OPMT 5751: Important Formulas and Relations from Regression

Total Sum of Squares:	$TSS = \sum(Y_i - \bar{Y})^2$
Residual Sum of Squares:	$RSS = \sum(\hat{Y}_i - \bar{Y})^2$
Error Sum of Squares:	$RSS = \sum(Y_i - \hat{Y}_i)^2$

Where Y_i is actual Y value, $\hat{Y}_i$ is predicted Y value, and $\bar{Y}$ is the average of actual Y values

Note that

$$\hat{Y}_i = a + bX_i$$

and we get a (intercept) and b (coefficient) from the Regression

The R-Squared is

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

Varience and Standard Errors:

Varience of the error term is

$$s_e^2 = \frac{ESS}{n-2} = \frac{\sum e_i}{n-2}$$

Therefore, the standard error is:

$$s_e = \sqrt{\frac{ESS}{n-2}}$$

The Varience of b is

$$s_b^2 = \frac{\frac{ESS}{n-2}}{\sum \left(X_i - \bar{X}\right)^2}$$

Thus the Standard Error of b is

$$s_b = \sqrt{\frac{\frac{ESS}{n-2}}{\sum \left(X_i - \bar{X}\right)^2}}$$

NOTE: All of these values are produced automatically from the *Regression Toolpack output*. However, they can all be calculated by hand in the Spreadsheet as long as we have the estimates for a and b.