

Question #10

a) Since the regression coefficient for x_1 is 15.660. this means that, holding rest of the variables constant, a change of one in x_1 is associated with a change of 15.660 in y .

$$\begin{aligned} \text{b) Confidence interval} &= b_3 \pm t_{\alpha/2, n-2} \cdot s_{b_3} \\ &= 7.356 \pm 2.259 \times 10.282 \\ &= 7.356 \pm 23.224 \\ &= (7.356 - 23.224, 7.356 + 23.224) \\ &= (-15.868, 30.580) \end{aligned}$$

$$\text{c) } SST = SSR + SSE = 3822396 + 96092902 = 99915298$$

$$R^2 = \frac{SSR}{SST} = \frac{3822396}{99915298} = 0.0383 \text{ or } 3.83\%$$

A 3.83% it is seems small and an indicator of a poor goodness of fit for the observation.

$$\text{d) } H_0: \beta_1 = \beta_2 = \beta_3 = 0$$

$$H_a: \beta_1 \neq \beta_2 \neq \beta_3 \neq 0$$

$$\alpha = 0.05$$

This right tailed F-test.

$$F = \frac{\frac{SSR}{k-1}}{\frac{SSE}{n-k-1}} = \frac{\frac{3822396}{3-1}}{\frac{96092902}{189-3-1}} = \frac{1911198}{51421.0919} = 3.679$$

$$p\text{-value} = 0.027$$

Since $0.027 < 0.05$, reject the null hypothesis.

Therefore, reject the null hypothesis and conclude that there is a significant evidence of relationship between among the variables.

e)

It is assumed that the relationship between each predictor variable and the criterion variable is linear. If this assumption is not met then the predictions may systematically overestimate the actual values for one range of values on a predictor variable and underestimate them for another.