1. page 547  # 11.2

a) \( \hat{\beta}_0 = 506.346 \)
\( \hat{\beta}_1 = -941.900 \)
\( \hat{\beta}_2 = -429.060 \)

b) \( \hat{y} = 506.346 - 941.9 x_1 - 429.06 x_2 \)

c) \( \text{SSE} = 151015.724 \)
\( \text{MSE} = \frac{\text{SSE}}{n-(k+1)} = 8883.278 \)
\( S = \sqrt{\text{MSE}} = 94.251 \)

Interpretation:
We expect about 95% of the \( y \) values to fall within \( \pm 25 \) or \( \pm 2(94.251) \) or \( \pm 188.502 \) units of the fitted regression equation.
d) \( H_0: \beta_1 = 0 \) vs \( H_A: \beta_1 \neq 0 \)

From the output

p-value = 0.0032 < \( \alpha = .05 \)

\( \Rightarrow \) reject \( H_0 \)

e) \( S_{\hat{\beta}_1} = 379.8 \times 6 \)

95% CI: \( \hat{\beta}_1 \pm t_{\alpha/2, n-(k+1)} S_{\hat{\beta}_1} \quad (t_{0.05, 17} = 2.11) \)

\( = -429.060 \pm 2.11 \times (379.8 \times 6) \)

\( \Rightarrow (-1230.493, 372.373) \)

Notice that this CI covers zero, meaning that we should believe that \( \beta_1 = 0 \) at 95\% level

2. page 567, # 11.29

a) \( R^2 = 52.9\% \)
\( R_a^2 = 50.5\% \)

b) \( F = 21.88 \)

since p-value \( \approx 0 \), which is very small

\( \Rightarrow \) reject \( H_0 \)
\( \hat{\mathbf{y}} = 131.924 + 2.736x_1 + .1042x_2 - 2.547x_3 \)

b) \( H_0: \beta_2 = \beta_3 = 0 \)

\( H_a: \) at least one \( \beta_i \neq 0 \) for \( i = 1, 2, 3 \)

\[ F = \frac{MSE}{MSR} = \frac{1719.4379}{966.243} = 17.87 \]

reject \( H_0 \), if \( F > F_{0.01, 10, 16} = 5.29 \)

\( \Rightarrow \) reject \( H_0 \)

There's sufficient evidence to indicate a relationship exists between hours of labor and at least one of the independent variables at \( \alpha = 0.01 \)

c) \( H_0: \beta_1 = 0 \)

\( H_a: \beta_1 \neq 0 \)

from the output, \( p\)-value = 0.6199 > \( \alpha = 0.05 \)

\( \Rightarrow \) can NOT reject \( H_0 \)

There's insufficient evidence to indicate a relationship exists between hours of labor and percentage of units shipped by truck, all other variables held constant, at \( \alpha = 0.05 \).
d) \[ R^2 = R_{-54}^2 = 0.7701 \]

We conclude that 77% of the sample variation of the labor hours is explained by the regression model.

e) If the average number of pounds per shipment increase from 20 to 21, the estimated change in mean number of hours of labor is -2.587

Thus, it will cost $7.50 (2.587) = $19.405 less if variable x1 and x2 are constant.

f) Standard error = s = 9.81, we can estimate approximately with 95% precision or ± 2(9.81) or ± 19.62 hours