

2.

	SS	DOF	MS	F
Regression	①	②	④	⑥
Error	21.25	③	1.18	
Total	173.38	⑤		

$$① \text{ SSR} = \text{SST} - \text{SSE} = 152.13$$

$$② \text{ DOF of regression} = 1 \leftarrow \text{Always 1 in chapter 11.}$$

$$③ \text{ DOF error} = \frac{\text{SSE}}{\text{MSE}} = 18 \rightarrow \text{DOF error} = n - 2 \leftarrow \text{always in chapter 11.} \rightarrow \boxed{n = 20}$$

$$④ \text{ MSR} = \frac{\text{SSR}}{1} = 152.13$$

$$⑤ \text{ DOF Total} = n - 1 = 19$$

$$⑥ \text{ } F_0 = \frac{\text{MSR}}{\text{MSE}} = 128.9 \rightarrow \text{Using } F_0 \rightarrow P\text{-value} \approx 0 \rightarrow \text{Reject } H_0$$

$$3. a. b_1 = \frac{S_{xy}}{S_{xx}} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{n \sum x_i^2 - (\sum x_i)^2} = \frac{20 \times 1083.67 - 1478 \times 12.75}{20 \times 143215.8 - (1478)^2} = 0.004$$

$$b_0 = \bar{y} - b_1 \bar{x} = \frac{12.75}{20} - 0.004 \times \frac{1478}{20} = 0.33$$

$$b. \hat{y} = 0.33 + 0.004 \times 85 = 0.68$$

4.

	SS	DOF	MS	F
Regression	1271.9	1	1271.9	91.42
Error	222.6	16	13.9	
Total	1494.5	17		

Using $F_0 \rightarrow P\text{-value} \approx 0$

$\rightarrow \text{Reject } H_0$

Regression line
 $\hat{y} = b_0 + b_1 x$
 $\hat{y} = 0.46 + 20.56 x$

$$c. \hat{\sigma}_{b_1}^2 = \frac{\text{MSE}}{S_{xx}} = \frac{13.9}{3.01} = 4.61 \rightarrow \hat{\sigma}_{b_1} = \sqrt{\hat{\sigma}_{b_1}^2} = 2.15$$

$$\hat{\sigma}_{b_0}^2 = \frac{\text{MSE} \sum x_i^2}{n S_{xx}} = \frac{13.9 \times 14.7}{18 \times 3.01} = 3.78 \rightarrow \hat{\sigma}_{b_0} = 1.94$$

$$(\alpha = 1\%) \text{ d. } T_0 = \frac{b_0 - 0}{\hat{\sigma}_{b_0}} = \frac{0.46}{1.94} = 0.24$$

$$AR = [-t_{\alpha/2, n-2}, t_{\alpha/2, n-2}] = [-2.89, 2.89]$$

Since $T_0 \in AR \rightarrow \text{Accept } H_0 \rightarrow \text{intercept is better to be removed.}$