Chapter 11 :

1.

a. dependant variable = Insurance Premium = y
independant variable = Driving experience = x

b. $S_{xx} = \sum (x_i - \bar{x})^2 = 383.5$

$S_{yy} = \sum (y_i - \bar{y})^2 = 1557.5$

$S_{xy} = \sum (x_i - \bar{x})(y_i - \bar{y}) = -593.5$

c. $y = b_0 + b_1 x$ ← Regression line.

$$b_1 = \frac{S_{xy}}{S_{xx}} = \frac{-593.5}{383.5} = -1.55$$

$$b_0 = \bar{y} - b_1 \bar{x} = 76.66$$

d. $e_i = y_i - \hat{y}_i \longrightarrow e_5 = y_5 - \hat{y}_5 = 44 - (76.66 - 1.55 \times 15) = -9.45$

chapter 11 → e. Unbiased estimator for σ is ALWAYS (in chapter 11) $\sqrt{\frac{SSE}{n-2}} = \sqrt{\frac{S_{yy} - b_1 S_{xy}}{n-2}}$

$$\longrightarrow s = \sqrt{\frac{1557.5 - 1.55 \times 593.5}{8-2}} = 10.31$$

f. 90% CI for B_1 = $b_1 \pm t_{\alpha/2, n-2} \frac{s}{\sqrt{S_{xx}}} = -1.55 \pm t_{0.05, 6} \frac{10.31}{\sqrt{383.5}}$

$$= -1.55 \pm 1.94 \times \frac{10.31}{\sqrt{383.5}} = [-2.57, -0.52]$$

g. $\begin{cases} H_0 : B_0 \leq 0 \\ H_1 : B_0 > 0 \end{cases}$

$$T_0 = \frac{b_0 - 0}{s\sqrt{\frac{\sum x_i^2}{n S_{xx}}}} = \frac{76.66}{10.31\sqrt{\frac{1396}{8 \times 383.5}}} = 11.01$$

$\alpha = 5\%$

$AR = [-t_{\alpha/2, n-2}, t_{\alpha/2, n-2}] = [-2.44, 2.44]$

Since $T_0 \notin AR \longrightarrow H_0$ is Rejected with 95% Confidence