Homework #12

45.

Lower critical value

$-Z_{\alpha/2} = -Z_{0.01/2}$

$= -Z_{0.005}$

$= -2.576$

Upper critical value

$Z_{1-\alpha/2} = Z_{1-0.01/2}$

$= Z_{0.995}$

$= 2.576$

$z \geq z_{\alpha/2}$ or $z \leq -z_{\alpha/2}$

$z \geq 2.576$ or $z \leq -2.576$

$\hat{p} = \frac{x}{n} = \frac{82}{150} = 0.5466$

$z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} \rightarrow z = \frac{0.5466 - 0.4}{\sqrt{\frac{0.4 \times 0.6}{150}}} = 3.6666$

$z = 3.667$

$-Z_{\alpha/2} = -Z_{0.05/2}$ $\quad Z_{1-\alpha/2} = Z_{1-0.05/2}$

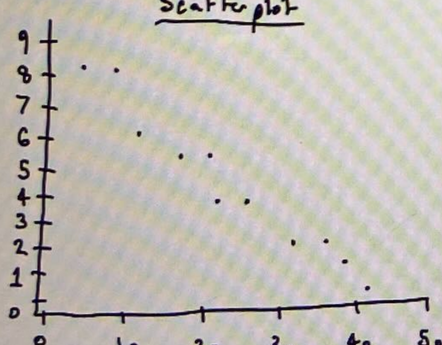
$= -Z_{0.025}$ $\quad = Z_{0.975}$

$= -1.96$ $\quad = 1.96$

* There is no difference in conclusion with a 0.05 significance level

4.

Scatterplot



* This linear regression model is a good modeling strategy because it shows more variation in dependent variable.

7.

a. $y = 1800 + 1.3x$

$y = 1800 + 1.3 \cdot 2.500 = 505$

b. * The change in standard-cured strength is 1.3 psi

c. * The standard-cured strength increases by 130 psi

d. * The standard-cured strength decreases by 130 psi

12.

$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}}$

$= \frac{-341.959231}{1585.230769}$

$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x}$

$= \left(\frac{\sum y_i}{n}\right) - (-0.2157)\left(\frac{\sum x_i}{n}\right)$

$= \left(\frac{52.8}{13}\right) - (-0.2157)\left(\frac{303.7}{13}\right)$

$= 4.0615 + 5.0391 = 9.1006$

$\hat{y} = 9.1006 - 0.2157x$

$= 9.1006 - 0.2157(25)$

$= 9.1006 - 5.3925$

$= 3.7081$

13.

$SS_{xy} = \sum xy - \frac{(\sum x)(\sum y)}{n} = 333 - \frac{(200)(5.37)}{4}$

$SS_{xx} = 2000$ $\qquad = 64.5$

$SS_{yy} = 2.140875$

$SSE = 9.3501 + 1.4419 - 10.73925$

$= 0.06075$

$SST = 9.3501 - \frac{(5.37)^2}{4}$

$= 2.140875$

* The value of r^2 is very high and 97.2% of the variation in y is explained by variable x

$\hat{\beta}_1 = \frac{64.5}{2000} = .03225$

$\hat{\beta}_0 = \frac{5.37 - 6.45}{4} = -0.27$