

Homework 9 Solution

Sta113, ISDS

April 20, 2003

Total 25 points.

12.1 (5 points)

a.

$$\mathbf{Y} = \begin{bmatrix} 1 \\ 2 \\ 2 \\ 3 \\ 5 \\ 5 \end{bmatrix}; \mathbf{X} = \begin{bmatrix} 1 & 1 \\ 1 & 2 \\ 1 & 3 \\ 1 & 4 \\ 1 & 5 \\ 1 & 6 \end{bmatrix}$$

b.

$$\mathbf{X}'\mathbf{X} = \begin{bmatrix} 6 & 21 \\ 21 & 91 \end{bmatrix}; \mathbf{X}'\mathbf{Y} = \begin{bmatrix} 18 \\ 78 \end{bmatrix}$$

d.

$$\hat{\beta} = \begin{bmatrix} 0 \\ \frac{6}{7} \end{bmatrix};$$

e.

$$\hat{y} = \frac{6}{7}x$$

12.11 (5 points)

a. Quadratic **b.** Reject $H_0 : \beta_2 = 0$; $t = -15.78$ **c.** 0.00005 **d.** 188.892

12.18 (5 points)

a. $R^2 = 0.262$; no **b.** $F = 1.896$; do not reject H_0

12.32 (5 points)

a. Misspecified model; quadratic term missing **b.** Unequal variances **c.** Outlier **d.** Unequal variances **e.** Nonnormal errors

12.33 (5 points)

a. Yes; $p = 0.0001$ **b.** No, but unusual observation at $\hat{y} = 777.0$ **c.** Yes **d.** Model is useful ($p = 0.0001$); Boston Harbor residual has $z = -2.779$