

## STAT 512 HW #6 Solutions

- 7.1. (1) 1 (2) 1 (3) 2 (4) 3
- 7.3. a.  $SSR(X_1) = 1,566.45$ ,  $SSR(X_2|X_1) = 306.25$ ,  $SSE(X_1, X_2) = 94.30$ ,  $df: 1, 1, 13$ .  
 b.  $H_0: \beta_2 = 0$ ,  $H_a: \beta_2 \neq 0$ .  $SSR(X_2|X_1) = 306.25$ ,  $SSE(X_1, X_2) = 94.30$ ,  $F^* = (306.25/1) \div (94.30/13) = 42.219$ ,  $F(.99; 1, 13) = 9.07$ . If  $F^* \leq 9.07$  conclude  $H_0$ , otherwise  $H_a$ . Conclude  $H_a$ .  $P$ -value = 0+.
- 7.7. a.  $SSR(X_4) = 40.5033$ ,  $SSR(X_1|X_4) = 42.2746$ ,  $SSR(X_2|X_1, X_4) = 27.8575$ ,  
 $SSR(X_3|X_1, X_2, X_4) = 0.4195$ ,  $SSE(X_1, X_2, X_3, X_4) = 98.2306$ ,  $df: 1, 1, 1, 1, 76$ .  
 b.  $H_0: \beta_3 = 0$ ,  $H_a: \beta_3 \neq 0$ .  $F^* = (0.42/1) \div (98.2306/76) = 0.3249$ ,  $F(.99; 1, 76) = 6.9806$ . If  $F^* \leq 6.9806$  conclude  $H_0$ , otherwise  $H_a$ . Conclude  $H_0$ .  $P$ -value = .5704.
- 7.16. a.  $\hat{Y}^* = .89239X_1^* + .39458X_2^*$   
 c.  $s_Y = 11.45135$ ,  $s_1 = 2.30940$ ,  $s_2 = 1.03280$ ,  $b_1 = \frac{11.45135}{2.30940}(.89239) = 4.425$ ,  
 $b_2 = \frac{11.45135}{1.03280}(.39458) = 4.375$ ,  $b_0 = 81.7500 - 4.425(7) - 4.375(3) = 37.650$ .
- 8.4. a.  $\hat{Y} = 82.9357 - 1.18396x + .0148405x^2$ ,  $R^2 = .76317$   
 b.  $H_0: \beta_1 = \beta_{11} = 0$ ,  $H_a$ : not both  $\beta_1$  and  $\beta_{11} = 0$ .  $MSR = 5915.31$ ,  $MSE = 64.409$ ,  
 $F^* = 5915.31/64.409 = 91.8398$ ,  $F(.95; 2, 57) = 3.15884$ . If  $F^* \leq 3.15884$  conclude  $H_0$ , otherwise  $H_a$ . Conclude  $H_a$ .  
 c.  $\hat{Y}_h = 99.2546$ ,  $s\{\hat{Y}_h\} = 1.4833$ ,  $t(.975; 57) = 2.00247$ ,  $99.2546 \pm 2.00247(1.4833)$ ,  
 $96.2843 \leq E\{Y_h\} \leq 102.2249$   
 d.  $s\{\text{pred}\} = 8.16144$ ,  $99.2546 \pm 2.00247(8.16144)$ ,  $82.91156 \leq Y_{h(\text{new})} \leq 115.5976$   
 e.  $H_0: \beta_{11} = 0$ ,  $H_a: \beta_{11} \neq 0$ .  $s\{b_{11}\} = .00836$ ,  $t^* = .0148405/.00836 = 1.7759$ ,  
 $t(.975; 57) = 2.00247$ . If  $|t^*| \leq 2.00247$  conclude  $H_0$ , otherwise  $H_a$ . Conclude  $H_0$ . Alternatively,  $SSR(x^2|x) = 203.1$ ,  $SSE(x, x^2) = 3671.31$ ,  $F^* = (203.1/1) \div (3671.31/57) = 3.15329$ ,  $F(.95; 1, 57) = 4.00987$ . If  $F^* \leq 4.00987$  conclude  $H_0$ , otherwise  $H_a$ . Conclude  $H_0$ .  
 f.  $\hat{Y} = 207.350 - 2.96432X + .0148405X^2$   
 g.  $r_{X, X^2} = .9961$ ,  $r_{x, x^2} = -.0384$