Homework 3

SST = 21666.2

$t = \frac{\bar{y} - \mu_0}{\frac{s}{\sqrt{n}}}$ $SS_{Trt} = 24.200$

1)

a. ~~28938~~ ① y = Supp + intercept

② y = ~~Intc~~ intercept

1) F-Ratio

2) t-test squared

① $y = .87294$ ~~Supp~~ $+ .84\,supp$

② $y = .87294$

24.200	1	
2142	18	
2166.200	19	

24.2	.203	
119		

$F = \frac{\sqrt{SS_{Trt}}}{MSE} = .203$

$t = \sqrt{.203}$

$= .45 < 2.05$

thus, fail to reject that the supp coefficient $= \emptyset$

b)

	SS	dF	MS	F
Reg	2015.300	1	2015.300	240.49
Err	150.9	18	8.38	
Tot	2166.200	19		

assuming $y = 1.13z + .87294$

$y = .87294 + 1.13z$

or ?

$y = 1.13z$

$R^2 = \frac{SS_r}{SS_T} = \frac{2015.300}{2166.200} = .93$

c) i. $y = .87294 + .84259x + 1.13$

positive

.84 estimated increase

± 1.22 S.E.

ii. $y = .87294 + .84259x_1 + 1.13117z$

$.87294 + 1.13117(50) = 57.431$

$.87294 + .84259(1) + 1.13117(50) = 58.27403$

2a) $X = (n \times (p+1))$ $\quad n = 4 \quad p = 2$

4×3

$$X = \begin{bmatrix} 1 & 1 & -2 \\ 1 & 0 & -1 \\ 1 & 0 & 2 \\ 1 & 2 & 1 \end{bmatrix} \qquad Y = \begin{bmatrix} 68 \\ 57 \\ 90 \\ 112 \end{bmatrix}$$

$$X'X = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 0 & 0 & 2 \\ -2 & -1 & 2 & 1 \end{bmatrix} \times \begin{bmatrix} 1 & 1 & -2 \\ 1 & 0 & -1 \\ 1 & 0 & 2 \\ 1 & 2 & 1 \end{bmatrix}$$

$3 \times 4 \quad * \quad 4 \times 3 \quad = 3 \times 3$

$X'X$

$$\begin{bmatrix} 1 & 2 & 0 \\ 2 & 4 & 0 \\ 0 & 0 & 10 \end{bmatrix}$$

$[(1)(1)] \times 4 = 1$

$(1)(1) + (1)(2) = 2$

$(-2) + (-1) + 2 + 1 = 0$

$(1)(1) + (2)(1) = 2$

$(1)^2 + (2)(2) = 4$

$(-2) + 0 + 0 + 2 = 0$

$(-2)(-2) + (-1)(-1) + 4 + 1 = 10$

$(-2)(1) + 2 = 0$

$(-2) + (-1) + 2 + 1 = 0$

$$X'Y = \begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 0 & 0 & 2 \\ -2 & -1 & 2 & 1 \end{bmatrix} \times \begin{bmatrix} 68 \\ 57 \\ 90 \\ 112 \end{bmatrix} = \begin{bmatrix} 327 \\ 292 \\ 99 \end{bmatrix}$$

$X'Y$

$3 \times 4 \quad * \quad 4 \times 1 \quad = 3 \times 1$

b) Proc Reg; model HW3 = XPX I / $(X'X)^{-1}$ options

$$\begin{bmatrix} .45 & -.27 & \\ -.27 & .36 & \\ 0 & 0 & \end{bmatrix}$$

$68 + 57 + 90 + 112 = 327$

$68 + 224 = 292$

$(-2)(68) + (-1)(57) + 2(90) + 112 =$

$-136 + -57 + 180 + 112 = 99$

c) $(X'X)^{-1}X'Y$ are least squares the parameter estimates for the least squares lines of regression equations

normal equations

$$\begin{bmatrix} 69 \\ 17 \\ 9.9 \end{bmatrix}$$

COVB

HW3

3) $\frac{SSR_F - SSR_r / 1}{MSE_F}$ $\frac{\beta_2}{SE}$

a) PCORR Type II

girth = .91894

b) ~~PC~~ORR Type II

height = .19527

c) residuals ~~between~~ from a model & a model w/ residuals from X_1 & X_2

w/ only X_1