HW5

1

Source	df	SS	MS	F
a) Model	3	14522.25	4840.75	4.07
err	8	4997.76	624.72	
total	11	19520.01		

$\bar{y} = 194.75$

$165 - 194.75$

$165 - 194.75$

$199 -$

$250 -$

$= \begin{pmatrix} -29.75 \\ 4.25 \\ 4.25 \\ 55.25 \end{pmatrix}^2 +$

$SS_{Trt}: \sum\sum (\bar{y}_{i+} - \bar{y}_{..})^2$ +

$SS_E \sum\sum (y_{ij} - \bar{y}_{i+})^2$

$SST \sum\sum (y_{ij} - \bar{y}_{..})^2$

3 since 3 obs in each trt → $3(4840.75)$

$SS_{Trt} = 14522.25$

$MS(SS_{trt}) = \frac{SS_{trt}}{t-1} = \frac{SS_{trt}}{3}$

$= 4840.75$

$MS(E) = \text{sum}\begin{bmatrix} 27.50 \\ 23.43 \\ 22.51 \\ 26.21 \end{bmatrix}^2 \times \frac{1}{4}$

$\frac{SSE}{n-t}$

$n - t = 8$

$MSE = 2498.88 \times \frac{1}{4} = 624.72$

$MSE = \frac{SSE}{df}$

$624.72 = \frac{SSE}{8}$

$SSE = 4997.76$

$MSE = \frac{\sum (y_{ij} - \bar{y}_{i+})^2}{t}$

b) $\frac{14522.25 - 12528/2}{624.72}$ ← df = Full Model df - Red. Model df

$\frac{1994.25/2}{624.72} = \frac{4.59}{1.6}$

$qf(.95, 2, 8) = 4.46 > 1.6$

Not significant

c) proc reg; *see HWS.sas results

$y = 151.4 + 14.45x$

1	12528	12528	17.92
10	6992.100	699.21	
11	19520		

b) Testing for this is testing against $y = \mu$ since we are removing our only factor, time.

To test this, we can:

$$\frac{SSR_f - SSR_r / \Delta df}{MSE_F / \Delta df \text{ of err of full}}$$

We know that SSR_r for a model with no effects is equal to: ?

~~$SSR \cdot (y - \bar{y}..)$~~

$MS(H_0) = 194.75$

624.72

d) $$\frac{SS_{trt} - SSR / \Delta df}{MSE_F / df \text{ of error}}$$

14522.25 - ~~15716~~

c) Factorial Model

$MSE = 624.27$

SLR MSE = 699.21

2]

a) $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4$ $= t$ $df = 7$

i. $N = 24^{obs}$ 8 ~~combos~~ treatments 3^{obs} per trt

7	$t-1$	7
16	$n-t$	16
n 23	$n-1$	23

iii. $H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$ $H_a: \mu_i \neq$ .. ~~$\tau_i = 0$~~

qf(.95, 7, 16) = 2.65

1-pf(2.65, 7, 16, 198.625)

= 1 ?

ii. var(c(150,170,200,250))

= 1891.667

$\gamma = \frac{24(7)\,1891.667}{(40)^2}$

= 198.625

iv. plot( ), type = "b", ylab = "power"

3]

$\mu_1 = 70$ $\mu_2 = \mu_4$ $H_a: \mu_1 \neq \mu_4$ $= 70$ $= 180$

H_0: ~~$\mu_2 = \mu_2 = \dots = \mu_4$~~

a) $\gamma = \frac{n(t-1)\tau_T^2}{\sigma^2}$ $\sigma = 10$ $N = 24$ $n = 3$

$t = 8$

$\frac{3(8-1)\tau_T^2}{(10)^2}$ $(\tau^2) =$ ~~var(70, 180, 90, 120, 180)~~ $= \frac{1}{t-1}\Sigma(\mu_i - \mu)^2$

var(c(70, 90, 120, 180)) $\mu = 115$

$\mu_0 = \mu$ $\mu_2 = \mu + 20$ $\mu_4 = \mu + 50$

$\frac{3(7)2300}{100}$ $\mu_6 = \mu + 110$

= 483 qf(α, t-1, n-t) since $F = \frac{MSR}{MSE}$ $df = t-1$, $= n-t$

= qf(.95, 7, 16)

= 2.65

1-pf(2.65, 7, 16, 483) = 1 ?