3 14522.25 4840.75 $\cancel{4.07}$ 7.749

8 + 4997.76 624.72 $\bar{y}_{..} = 194.75$

11 19520.01

\# of obs in trt

$$\begin{pmatrix} -29.75 \\ -29.75 \\ 4.25 \\ 55.25 \end{pmatrix}^2 = \quad 4840.75(3) = 14522.25$$

$$SS_{trt}/3 = 4840.75$$

$$MSE = \frac{1}{4}\sum\begin{bmatrix} 27.50 \\ 23.43 \\ 22.51 \\ 26.21 \end{bmatrix}^2 = 2498.88 \times \frac{1}{4} = 624.72$$

$$624.72 = \frac{SSE}{8} \qquad SSE = 4997.76$$

~~other side~~ $N(\bar{y})^2 = (12)(194.75)^2 = \cancel{2337}\ 2337$

$$\frac{...2.25 - 2337}{\cancel{4997.76}/8 \quad 624.72/8} = \frac{12185.25}{\cancel{624.72}\ \cancel{78.09}\ 78.09} = 156.0411$$ Sign.

$F(.95, 3, 8) = 4.066$

1e Fact MSE = 624.72

SLRMSE = 635.64

...therside

$$\frac{14522.25 - 12528/\ \cancel{3}4-1-1=2}{4997.76\ \cancel{624.72}/8} = \cancel{25.54} > \cancel{4.066}$$ 3.19 < 4.06

~~sign~~ not sign

4 means 1891.667

8 means ~~4287.5~~ ~~1891.667~~

2

a) $H_0: \beta_1 = \dots \beta_{4}$

i. $\boxed{df = 7 \quad 7}$

$8-1=7$ 16

23

$\frac{MST^{t-1}}{MSE^{n-1}}$ ~~MSE~~ since we comparing across all trtmeans

iii. qf(.95, 7, 8*(n-1))

qf(.95, 7, 16) = 2.66

Power

1-pf(2.65, 7, 16, ~~24.83~~ 17.41) = $\boxed{.~~56~~70}$

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

= ~~1891.667~~

$\boxed{= 17.41}$

$\gamma = \frac{(7)(3)\,var(c(15\dots))}{40^2}$

n = 3 = ~~24.83~~

t-1 = 7

=

iv. See screenshot

$\frac{\mu}{2\sigma}$ 170-190

= 10 assum

2b

~~Dr. Osbourne~~

R plot

mu +/- 2σ = 40

4σ = (190-170)

4σ = 20

σ = 5

3a $\gamma = \frac{n(t-1)\,x_T^2}{\sigma^2}$ n=3 t=8

var(c(70…

= 1564

$\frac{3(7)1564.29}{5^2}$

10950

~~= 328.50~~ seems lar

$\boxed{= 1314}$

3b The effect will be much larger since our F stat is so big. This will move our alt. F d further away from Central F

qf(.95, 7, 16) = 2.66

1-pf(2.66, 7, 16, ~~562~~ 1318) is m ??

Bigger effect apparent due to

3 $\quad 14522.25$ $\quad 4840.75$ $\quad \cancel{4.07}\ 7.749$

8 $\quad + 4997.76$ $\quad 624.72$ $\quad \bar{y}_{..} = 194.75$

11 $\quad 19520.01$

# of obs in trt

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

$4840.75(3) = 14522.25$

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$$624.72 = \frac{SSE}{8} \quad SSE = 4997.76$$

~~other side~~ $N(\bar{y})^2 \cdot (12)(194.75)^2 = \cancel{2337}\ 2337$

$$\frac{22.25 - 2337}{\cancel{4997.76}/8 \quad 624.72/8} = \frac{12185.25}{\cancel{624.72}\ \cancel{78.09}\ 78.09} = 156.0411$$

Sign.

$f(.95, 3, 8) = 4.066$

le] Fact MSE = 624.72

SLRMSE = 635.64

other side

$$\frac{14522.25 - 12528 / \cancel{3}\,4 - 1 - 1 = 2}{4997.76\ \cancel{624.72} / 8} = \cancel{25.54} > \cancel{4.066}$$

3.19 < 4.06

not sign

~~sign~~

4means 1314.667

2

a) $H_0: \beta_1 = \ldots \beta_4$

i. $\boxed{df = 7 \quad 7}$

$8-1=7$ 16

23

$\frac{MST^{t-1}}{MSE^{n-1}}$ ~~MSE~~ since we comparing across all trtmeans

iii. $qf(.95, 7, 8^*(n-1))$

$qf(.95, 7, 16) = 2.66$

$1-pf(2.65, 7, 16, \overset{17.41}{\cancel{24.83}}) = \boxed{.\cancel{56}70}$ Power

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

$= \cancel{1891.667}$

$\boxed{= 17.41}$

8means ~~1287.5~~ ~~1891.667~~

$\gamma = \frac{(7)(3)\,var(c(15\ldots))}{40^2}$

$n=3$ $= \cancel{24.83}$

$t-1=7$

=

iv. See screenshot

2b| ~~Dr. Osbourne~~

Rplot

$\frac{\mu}{2\sigma}$ 170-190 $= 10$ assume

$mu \pm 2\sigma = 4\sigma$

$4\sigma = (190-170)$

$4\sigma = 20$

$\sigma = 5$

3a| $\gamma = \frac{n(t-1)\,x_T^2}{\sigma^2}$ $n=3$ $t=8$

var(c(70... $= 1564.$

$\frac{3(7)1564.29}{5^2}$ 10950

$\cancel{= 328.59}$ seems lar

$\boxed{= 1314}$

3b| The effect will be <u>much</u> larger since our F stat is so big. This will move our alt. F d further away from Central F

$qf(.95, 7, 16) = 2.66$

$1-pf(2.66, 7, 16, \overset{1318}{\cancel{328}})$?? is m

Bigger effect apparent due to

e polynomial orthogonal contrasts 2c

o solve for 1c) and 1d)

$\hat{\theta} = -3\bar{y}_1 - 1\bar{y}_2 + 1\bar{y}_3 + 3\bar{y}_4$

65, 199, 250)

Sum of squares of the contrast = SSR

$SS(\hat{\theta}) = \dfrac{\hat{\theta}^2}{\sum\left(\frac{c_i^2}{n_i}\right)}$

$\dfrac{\text{Sum of squard trt coefficients}}{\text{trt sample size}}$

$= \dfrac{\hat{\theta}^2}{(9+1+1+9)/3} = R(\beta_1|\beta_0) = \boxed{12528}$

$(-3, -1, 1, 3)^2$

comes from

$\hat{\theta}_q^2$

1	Model	12528	
11	Err	6992.01	635.64
12	tot	19520.01	

e: $\dfrac{\text{sum}(x_i - \text{xbar})\, y_i}{Sxx}$

```
proc glm;

bw= day |day|day

run;
```

bar = ? xbar = 3

$0-3$
$x_i - \text{xbar} = -3$

$2-3$
$x_i - \text{xbar} = -1$

$4-3$
$x_i - \text{xbar} = 1$

$6-3 = 3$

$\hat{\theta} = \sum c_i \bar{y}_i$

$\hat{\theta} = 3 \times 165 - 165 + 199 + 3(250)$

$\hat{\theta} = 289$

$SS(\hat{\theta}) = \dfrac{(289)^2}{\ldots} = \dfrac{(289)^2}{20} = 289^2 \times \dfrac{3}{20}$

$4_a)$ $|\bar{D}| > q(t, N-t, \alpha)\sqrt{\frac{MS(E)}{n}}$ b)

$q(5, 15, .95)\sqrt{\frac{9.05}{4}}$

$qtukey(.95, 5, 15)\sqrt{\frac{9.05}{4}}$ $\boxed{6.57}$

$\bar{Y} =$

$n =$

glm tukey
class drug;
model y = drug;
means drug / tukey

~~1453.22.25~~

~~624.72/8~~

28.6	1	A
31.38	2	A
7.833		B
19.084		
27.85		A

$4_c)$ $\alpha' = \frac{\alpha}{k}$ k = # of contrasts $\alpha' = \frac{\alpha}{10}$ $\boxed{= .005}$

i. Compare any pairs of means 6.99

3.30

A B C D E
B A C D E
C B A D E = 10
D B C A E
E B C D A

$MSD = 6.99 = 3.286\sqrt{\frac{MSE}{3}}$

Group 3 & 4 are sign.

$= t((.05/2)/10, 15) * sqrt$

=

$t = 3.29$

S.E. of a contrast

$= \sqrt{MS(E)\sum \frac{c_i^2}{n_i}}$

$\sqrt{MSE\sum\frac{c^2}{n}}\left(t_{\frac{\alpha}{2}}, v\right)$

$qt(.995, \cancel{4}, 15)$

$= 2.9415 < 3.29$

$SS(contrast) = \frac{(C_i)^2}{\sum\left(\frac{c_i^2}{n}\right)}$

not sign.

28.6	1	A
31.38	2	A
7.83	3	B
19.07	4	C
27.8	5	A

5a mean(c(20,23,19)) = 20.667

var(c(20,23,19)) = ~~8.777~~ 4.33

2* v(c(20,23,19)) = 8.667

(3)*(2)* var(c(20,23,19)) = 26

$F = \frac{26}{1.5} = 17.331$

Sum of Squared Deviations

n = 6

MS_{trt}

a 6

$SS_{trt} = \sum^{i}\sum^{j} (\bar{y}_i - \bar{y})^2$

$= 6\sum^{i} (\bar{y}_i - \bar{y})^2$

$MS_{trt} = \frac{\sum^{i}\sum^{j} (\bar{y}_i - \bar{y})^2}{(3-1)}$

$= \frac{6\sum^{i} (\bar{y}_i - \bar{y})^2}{2}$

MSE = mean(c(.78, 1.38, 1.42)^2)

= 1.509

2

MS_{trt} = n * sample variance among ybar... ybart

var(c(20,23,19))*6

MSE = avg of ~~t~~ sample varinces

$s_1^2 + s_t^2$

mean(c(.78...)