	Homework 10 Solutions
	1. The interaction term is significant according to the F-test
	H:85=0 8.45 H: not Ho
	See attached cutput:
	F= 4503 P= 001288 <.05 Plejest Ho. Model chosen a two-way arrora model with interactions.
	2. Ho: linear regression model is good!" Hi: one-way arrora model is good!"
	See R output for the appropriate F-test.
	F = 4.138
otherwise day to see you and a state of the second of the	P=0.058.7.05
	⇒ Do not reject to
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September 1

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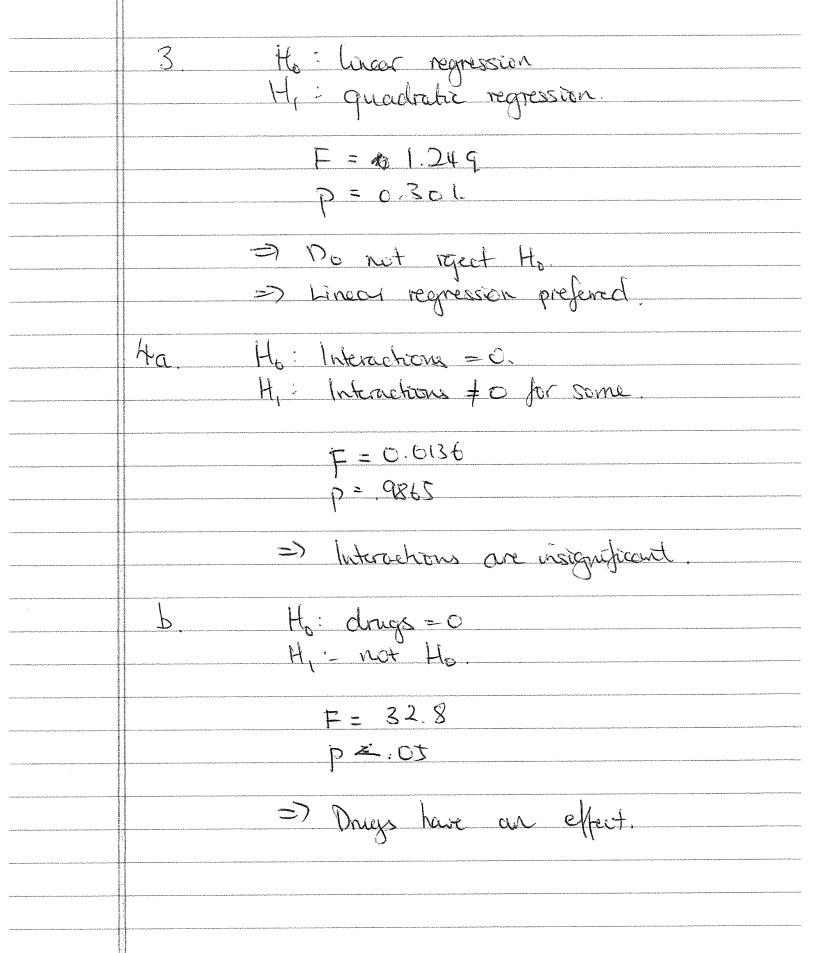
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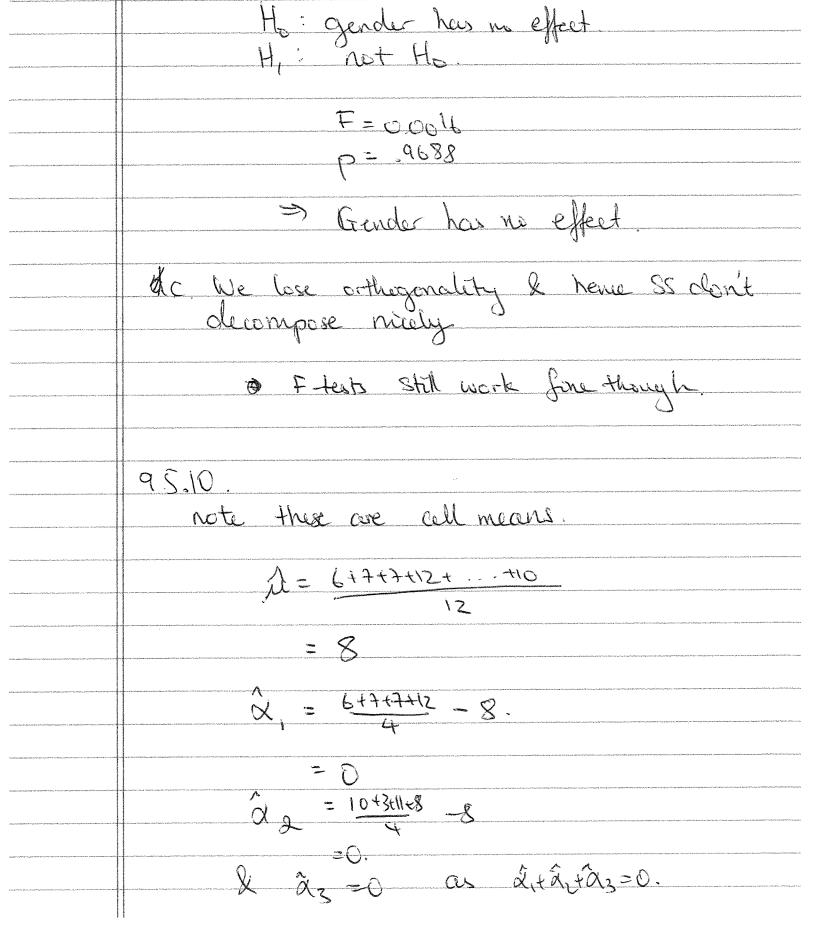
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$$\beta_2 = \frac{7+3+5}{3} - 8.$$

$$\hat{y}_1 = 6 - 8 - 8 + 8 = 4 - 2.$$

$$\hat{y}_2 = 7 - 8 - 5 + 8 = 2.$$

etc. Cloo lazy to do the rest U)

What is \beta?

$$\beta = (ATA)^{\prime}ATy \qquad A = \begin{pmatrix} 2i \\ 3in \end{pmatrix}$$

$$= \sum xiy \qquad \Rightarrow ATA = \sum xi^{2}$$

$$= \sum xi^{2} \qquad (ATA)^{-1} = \sum xi^{2}$$

$$= \sum xi^{2} \qquad (AT$$

Depends on (Exiyi) =

So it's something to do with sums

> # whincolath.

Zoryi - Normal distributed.

Ouestion 1:

Model 1: $y \sim x$

```
> anova(model.full, model.add)
Analysis of Variance Table
Model 1: data \sim A * B
Model 2: data ~ A + B
             RSS Df Sum of Sq F Pr(>F)
  Res.Df
      12 0.27500
1
      18 0.89417 -6 -0.61917 4.503 0.01288 *
2
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' '1
> summary(model.full)
Call:
lm(formula = data \sim A * B)
Residuals:
  Min
           10 Median
                        30
                              Max
 -0.2
        -0.1
                0.0
                       0.1
                              0.2
Coefficients:
           Estimate Std. Error t value Pr(>|t|)
(Intercept)
            42.5500
                        0.1070 397.502 < 2e-16 ***
                        0.1514 - 2.312 0.03933 *
A2
            -0.3500
                        0.1514
                               7.597 6.36e-06 ***
А3
             1.1500
                        0.1514 -2.973 0.01164 *
B2
            -0.4500
                        0.1514 7.927 4.13e-06 ***
             1.2000
В3
            -0.2000
                        0.1514 -1.321 0.21109
B4
                        0.2141 - 0.701 0.49688
A2:B2
            -0.1500
                        0.2141 0.701 0.49688
A3:B2
             0.1500
                        0.2141 -1.635 0.12802
            -0.3500
A2:B3
A3:B3
            -0.7500
                        0.2141 -3.503 0.00436 **
                        0.2141 - 2.102 0.05735.
            -0.4500
A2:B4
A3:B4
            -0.5500
                        0.2141 - 2.569 0.02459 *
Signif. codes: 0 '***' 0.001 '**' 0.05 '.' 0.1 ' '1
Residual standard error: 0.1514 on 12 degrees of freedom
Multiple R-squared: 0.9833, Adjusted R-squared:
F-statistic: 64.2 on 11 and 12 DF, p-value: 6.436e-09
Question 2:
> model.linear <- lm(y~x)</pre>
> model.anova <- lm(y~factor(x))</pre>
> anova(model.linear, model.anova)
Analysis of Variance Table
```

```
Model 2: y \sim factor(x)
  Res.Df RSS Df Sum of Sq F Pr(>F)
     10 36,621
   8 18.000 2 18.621 4.1379 0.05837 .
Signif. codes: 0 '***' 0.001 '**' 0.05 '.' 0.1 ' ' 1
Ouestion 3:
> anova(model.linear, model.quad)
Analysis of Variance Table
Model 1: y \sim x
Model 2: y \sim x + I(x^2)
  Res.Df RSS Df Sum of Sq F Pr(>F)
     8 163019
1
      7 138340 1 24679 1.2488 0.3007
Ouestion 4:
> anova(model.int, model.add)
Analysis of Variance Table
Model 1: IQ ~ gender * drug
Model 2: IQ ~ gender + drug
 Res.Df RSŠ Df Sum of Šq F Pr(>F)
1
     8 131.00
     10 131.45 -2 -0.44554 0.0136 0.9865
> anova(model.add, model.drug)
Analysis of Variance Table
Model 1: IQ ~ gender + drug
Model 2: IQ ~ drug
 Res.Df RSS Df Sum of Sq F Pr(>F)
     10 131.45
1
     11 131.47 -1 -0.021122 0.0016 0.9688
> anova(model.add, model.gender)
Analysis of Variance Table
Model 1: IQ ∼ gender + drug
Model 2: IQ ∼ gender
 Res.Df RSS Df Sum of Sq F Pr(>F)
     10 131.45
    12 993.88 -2 -862.43 32.806 4.046e-05 ***
Signif. codes: 0 '***' 0.001 '**' 0.05 '.' 0.1 ' ' 1
```