

Name Jenny

Student Number _____

STA 441s 2020 Quiz 2

1. (4 points) In a study comparing the effectiveness of different exercise programmes, volunteers were randomly assigned to one of three exercise programmes (A, B, C) or put on a waiting list and told to work out on their own. Thus, there were four experimental treatments. Denote the true treatment means by μ_a, μ_b, μ_c and μ_w .

Aerobic capacity is the body's ability to process oxygen. Using a standard treadmill test, aerobic capacity was measured before and after 6 months of participation in the program (or 6 months of being on the waiting list). The response variable was improvement in aerobic capacity.

- (a) What null hypothesis would you test to determine whether experimental treatment had any effect on average aerobic capacity? State the null hypothesis in symbols.

$$H_0: \mu_a = \mu_b = \mu_c = \mu_w$$

- (b) For the test of whether experimental treatment had any effect on average aerobic capacity, give the contrast or contrasts you would test. Make a table. There is one column in your table for each treatment mean, and one row for each contrast.

μ_a	μ_b	μ_c	μ_w
1	-1	0	0
0	1	-1	0
0	0	1	-1

as are okay
Anything equivalent to this.

- (c) What null hypothesis would you test to determine whether the average improvement from the three exercise programs was greater than improvement from the wait list control? State the null hypothesis in symbols.

$$H_0: \frac{1}{3}(\mu_a + \mu_b + \mu_c) = \mu_w \text{ or } \mu_a + \mu_b + \mu_c = 3\mu_w$$

- (d) For the test of whether average improvement from the three exercise programs was greater than improvement from the wait list control, give the contrast or contrasts you would test. Make a table. There is one column in your table for each treatment mean, and one row for each contrast.

μ_a	μ_b	μ_c	μ_w
1	1	1	-3

2. Please refer to your analysis of the Chick Weights data.

- (a) (1 point) What proportion of the variation in the chicks' weight is explained by type of feed? The answer is a number on your printout. Write the number in the space below. on the printout, circle the number and write "Question 2a" beside it.

$$R^2 = 0.54$$

- (b) (5 points) In your analysis of the Chick Weights data, you used Tukey multiple comparisons to test for all pairwise differences between means, at joint significance level 0.05. Based on this, answer each of the questions below "Yes" or "No." *To get any marks for this question, you can get no more than one wrong.*

- Is there sufficient evidence to conclude that sunflower is better than casin?

No

- Is there sufficient evidence to conclude that casin is better than meatmeal?

No

- Is there sufficient evidence to conclude that meatmeal is better than soybean?

No

- Is there sufficient evidence to conclude that soybean is better than linseed?

No

- Is there sufficient evidence to conclude that linseed is better than horsebean?

No

- Is there sufficient evidence to conclude that sunflower is better than horsebean?

Yes

- Is there sufficient evidence to conclude that casin is better than soybean?

Yes

Attach your log file and your output (results) file to the quiz paper. Make sure your name and student number are written clearly on both printouts.