

# ST2304 Continuation Exam 2020, marks scheme and comments on answers

Bob O'Hara

4/30/2021

## Problem 1: Lazy Mole Rats

### Question 1

1 mark. Correct answer: The value of the parameter that makes the data most likely

### Question 2

1 mark. Correct answer: Between -0.25 and -0.30 (I allow for some error)

### Question 3

1 mark. Correct answer: 0.18

### Question 4

Up to 4 marks. Correct answer: 1 for there is a difference 2 for significant p-value (or equivalent) 1 for "it's close".

### Question 5

1 mark. Correct answer: 0.195

### Question 6

4 marks. Correct answer: -0.10 to 0.49

### Question 7

1 mark. Correct answer: 48%

### Question 8

1 mark. Correct answer: Confirmatory

### Question 9

4 marks. Correct answer: 1 for "no apparent effect", 1-2 for "not significant" 2 for quoting p-value and other statistics

### Question 10

4 marks. Correct answer: 1 for saying there is no effect is there + 1 for some judgement of size (at worst, it is not statistically significant), better giving the effect, and some sort of context.

2 marks for justifying their answer, e.g. by comparison to mass effect, or (possibly) with  $R^2$

## Swallow Problem

### Question 11

1 mark. Correct answer: Exploratory

### Question 12

1 mark. Correct answer: AIC

### Question 13

2 marks. Correct answer: Mass + Sex + Continent

### Question 14

4 marks. Correct answer: 1 mark for "it has the lowest AIC." (or equivalent), 1 mark for citing it

2 marks for comparison to  $R^2$  (e.g. although model Y has a higher  $R^2$ , it also has more parameters), and/or saying how close it is to others (e.g. "model Z has an AIC that is only 1 higher, but is a bit simpler, so we could consider that).

### Question 15

2 marks. Correct answers:

Error has equal variance along line The relationship is linear There are no outliers

### Question 16

2 marks. Correct answer: Normally distributed error (residuals) There are no outliers

### Question 17

4 marks. Correct answer: OK, but... (2 marks):

1. no outliers (2 marks)
2. homoscedasticity (2 marks)
3. Linearity not good - curved (2 marks)
4. No influential points (2 marks)

### Question 18

4 marks. Correct answer:

Solutions:

1. Box-Cox transformation (2 marks)
2. Add Quadratic term

### Question 19

4 marks. Correct answer: 2 marks: plot against predictors, to check linearity of response to that predictor(& outliers?) 2 marks: plot Cook's D to check if there are influential points 2 marks for other sensible suggestions

### Question 20

1 mark. Correct answer: log

### Question 21

4 marks. Correct answer: 1 for African (or "not European") 2 for quoting effect sizes 1 for noting positive effect of size, even if not significant

### Question 22

4 marks. Correct answer: 0.06 0.1.06

### Question 22

4 marks. Correct answer: 0.17 1.19

### Question 23

4 marks.

1. 1 mark: African. Or,
2. 1 mark: doesn't matter, + 2 because the difference is small (<1%) with reasoning

Or, if a different answer is given, but it makes some sense and relies on the predictions, up to 4 marks.