[PRINT]

MATH2089 - Numerical Methods and Statistics T2- 2019,
Aref Taleb, 8/5/19 at 2:15:33 PM AEST

Question 1: Score 0/1

A new soft drink formula has been developed, and we would like to know if customers prefer it to the formula currently on the market. A sample of 263 potential customers are asked to try each drink and report which one they would prefer a free sample of (they had to choose one or the other). Let $\hat{p}$ be the sample proportion choosing the new formula, which is used to estimate .

Which of the below is the most appropriate choice of null and alternative hypotheses?

Your response	Correct response
$H_0 : \hat{p} = 0.5, \quad H_a : \hat{p} > 0.5$	$H_0 : = 0.5, \quad H_a : > 0.5$

Grade: 0/1.0

Total grade: 0.0×1/1 = 0%
Feedback:

Question 2: Score 0/1

If you are testing a hypothesis and the P-value is 0.0072, what do you conclude?

Your response	Correct response
There is some evidence against the alternative hypothess (but somewhat inconclusive).	**There is strong evidence against the null hypothesis.**

Grade: 0/1.0

Total grade: 0.0×1/1 = 0%
Feedback:

Question 3: Score 0/2

The lifetimes of a sample of chains were as follows:

[36, 27, 33, 16, 25, 40, 43, 38, 41, 16, 31, 23, 29, 26, 37, 33, 43, 39, 26, 40, 31, 33, 27]

Use Matlab to construct a 99% confidence interval for the true mean lifetime . Write the limits of this interval below, to two decimal places.

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Your response	Correct response
0.78	**27.257567±0.02**

Grade: 0/1.0

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Your response	Correct response

0.34	**36.481564±0.02**

Grade: 0/1.0

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Total grade: 0.0×1/2 + 0.0×1/2 = 0% + 0%
Feedback:

Question 4: Score 1/2

Consider the following result, which is used to make inferences about the mean difference based on samples X and Y:

$$\frac{\bar{D} - D}{S_D/\sqrt{n}} \sim t_{n-1}$$

where $D = X - Y$.

(a) What assumptions do we need to apply this result?

Your response	Correct response
We have a random sample, no further assumptions required	**The differences across each pair of samples can be considered as a random sample from a normal distribution**

Grade: 0/1.0

(b) What can you do with your data to check assumptions?

Your response	Correct response
Construct a normal qq plot of the paired differences	**Construct a normal qq plot of the paired differences**

Grade: 1/1.0

Total grade: 0.0×1/2 + 1.0×1/2 = 0% + 50%
Feedback:

Question 5: Score 0/1

Which of the following would increase the Type II error of a hypothesis test, that had significance level $= 0.05$?

Your response	Correct response
Increase the significance level (e.g. from 0.05 to 0.1) or decrease sample size	**Decrease the significance level (e.g. from 0.05 to 0.01) or decrease sample size**

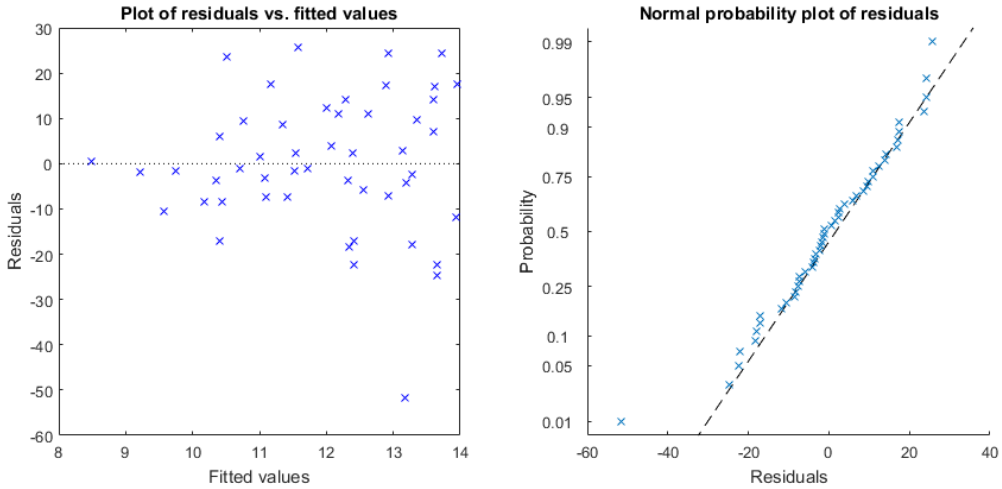
Grade: 0/1.0

Total grade: 0.0×1/1 = 0%

Feedback:

Question 6: Score 0/1

A linear regression analysis was undertaken, leading to the following plots.



Which one of the below statements best describes what you can say from these plots?

Your response	Correct response
The equal variance and linearity assumptions seem reasonable but there are problems with the normality assumption.	**It seems like there is a problem with the equal variance assumption.**

Grade: 0/1.0

Total grade: 0.0×1/1 = 0%
Feedback:

Question 7: Score 1/2

Microbial activity was measured on 18 samples, giving the following measurements (in mg per sample)
[281, 259, 270, 221, 251, 214, 195, 233, 300, 213, 158, 189, 236, 194, 297, 286, 169, 179]

Then a lime treatment was applied to each of the 18 samples (to balance soil pH), and microbial activity was measured again on the same 18 samples, giving the following measurements (in mg per sample):
[287, 282, 289, 220, 260, 218, 212, 219, 316, 232, 143, 193, 242, 209, 309, 305, 159, 200]

Use Matlab to test for evidence that the lime treatment increased microbial activity, at the 0.01 significance level.

Find a P-value for this test (to 3 decimal places)

Your response	Correct response
0.056	**0.004±0.001**

Grade: 0/1.0

Which of the following best summarises what you can conclude from this test?

Your response	Correct response
There is evidence that lime treatment increases microbial activity.	**There is evidence that lime treatment increases microbial activity.**

Grade: 1/1.0

Total grade: 0.0×1/2 + 1.0×1/2 = 0% + 50%
Feedback: