

**Crown Institute of Higher Education**

Examination Paper

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| Unit Code | Unit Title |
| BUS104 | Statistics for Business |

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| --- | --- |
| Last Name |  |
| First Name |  |
| Student ID |  |
| Date |  |
| Signature |  |
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**Examination instruction**

* This is a closed book examination
* Writing pen/s and calculator (not programmable) are permitted
* Duration of the exam is 2 hours PLUS 10 minutes of reading time
* Answer must be given in the separate answer booklet provided
* Answers must be clearly labelled
* Candidates must show all workings
* Phones and tablet devices are strictly not permitted
* Plagiarism may result you being suspended from the exam room immediately
* This exam booklet includes 3 pages including the title page.

**Examiner**

Name:

Phone number

**It is important that the examiner is available on this number for the duration of the exam**

Question 1 [10 marks]

'Cola wars' is the popular term for the intense competition between Coca-Cola and Pepsi displayed in their marketing campaign. The campaigns have featured movie and television stars , rock videos, athletic endorsement and claim of consumer preferences based on taste tests. Suppose as part of a Pepsi marketing campaign, 1, 000 cola consumers are given a blind taste test (i.e. a test in which the two brand names are disguised). Each consumer is asked to state preference for brand A and brand B.

**Required:**

1. Describe the population (2 marks)
2. Describe the variable of interest (3 marks)
3. Describe the sample (2 marks)
4. Describe the inference (3 marks)

Question 2 [10 marks]

Consider the following sample of n = 7 measurements:

5, 7, 4, 5, 20, 6, 2

**Required:**

1. Calculate the sample mean. Also explain the use of the sample mean. (3 marks)
2. Calculate the median of this sample (2 marks)
3. Calculate the median of the sample (2 marks)
4. Eliminate the last measurement (i.e. 2) and calculate the median of the remaining sample n=6 measurements (3 marks

**Question 3 [10 marks]**

The Youth service review, the bonus and/or sanction requests were recorded for each teen. The results are summarised in the table below:

**Bonus and Sanction for Greater Sydney school teens**

|  |  |
| --- | --- |
| **Request** | **Percentage** |
| No bonus or sanction (N) | 7 |
| Only bonus (OB) | 37 |
| Only sanction (OS) | 18 |
| Both, more bonuses than sanctions (BB) | 14 |
| Both, more sanctions than bonuses(BS) | 18 |
| Both equal number of bonuses and sanctions (BE) | 6 |
| Total | 100% |

**Required**

1. Assign the probability to the sample points (2 marks)
2. What is probability that both bonuses and sanctions are requested for a Sydney school teens? (4 marks)
3. What is the probability that only one type of request (either bonus or a sanction, but not both) is made? (4 marks)

**Question 4 [10 marks]**

Toyota car wants to test a new engine to determine whether it meets new air-pollution standards. The mean emission 'ս' for all engines of this type must be less than 20 parts per million of carbon. Then engines are manufactured for testing purposes and emission level of each is determined. The data (in parts million) are listed below:

15.6 16.2 22.5 20.5 16.4 19.4 166 17.9 12.7 13.9

**Required**

Do that data supply sufficient evidence to allow the manufacturer to conclude that this type of engines meets the pollution standards? It is assumed that Toyota is willing to risk a Type I error with probability of α = 0.01.

**Question 5**

Consider the following pairs of observation:

**x** 1 5 3 2 6 6 0

**y** 1 3 3 1 4 5 1

The summary output of regression analysis of the pair observations using the Excel is provide below

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **SUMMARY OUTPUT** | | | | | | |
| ***Regression Statistics*** | |  |  |  |  |  |
| Multiple R | 0.9105 |  |  |  |  |  |
| R Square | 0.8291 |  |  |  |  |  |
| Standard Error | 0.7404 |  |  |  |  |  |
| Observations | 6 |  |  |  |  |  |
| ANOVA |  |  |  |  |  |  |
|  | ***df*** | ***SS*** | ***MS*** | ***F*** | ***Significance F*** |  |
| Regression | 1 | 10.64015 | 10.64015 | 19.40587 | 0.011644 |  |
| Residual | 4 | 2.193182 | 0.548295 |  |  |  |
| Total | 5 | 12.83333 |  |  |  |  |
|  | ***Coefficients*** | ***SE*** | ***t Stat*** | ***P-value*** | ***Lower 95%*** | ***Upper 95.0%*** |
| Intercept | 0.625 | 0.585393 | 1.067659 | 0.345826 | -1.00031 | 2.250311 |
| 1 | 0.6022 | 0.136718 | 4.40521 | 0.011644 | 0.222682 | 0.981864 |

**Required**

1. Use the method of least square to fit a straight line to the seven data points in the pair of observation provided. (3 marks)
2. Specify the Null and Alternative hypothesis you would use to test whether the data provide sufficient evidence to indicate that x contributes information for the (linear) prediction of y. (2 marks)
3. What is test statistics that should be used in conducting the hypothesis test of question b. (2 marks)
4. Conduct they hypothesis test of question b using α = 0.05. (3 marks)