



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF THE BUILT ENVIRONMENT
DEPARTMENT OF PROPERTY STUDIES AND URBAN DESIGN
STATISTICS FOR THE BUILT ENVIRONMENT BLP 1207

FEBRUARY 2025

This examination paper consists of 5 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: K MAPONGA

Instructions

Answer **Question one (1)** from **Section A** and **any three (3)** questions from **Section B**.

MARK ALLOCATION

QUESTION	MARKS
1.	25
2.	25
3.	25
4.	25
5	25
6	25
TOTAL FOR THE FOUR QUESTIONS	100

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SECTION A

Question one

The test scores of a property studies class with 800 students are distributed normally with a mean of 75 and a standard deviation of 7.

- (i) Draw a normal distribution curve and indicate all the areas under the curve. (4)
- (ii) What percentage of the class has a test score between 68% and 82%? (4)
- (iii) How many students have a test score between 61% and 89%? (4)
- (iv) What is the probability that a student chosen at random has a test score between 54 and 75%? (4)
- (v) Calculate the number of students with a test score greater than or equal to 96%. (4)
- (vi) Determine the total number of students who scored between infinity and 96%. (5)

[25 Marks]

SECTION B

Question two

(a) Define the following terms;

- (i) Qualitative variables. (2)
- (ii) Discrete data. (2)
- (iii) Cumulative frequency (2)
- (iv) Correlation coefficient. (2)
- (v) Mutually exclusive event. (2)
- (vi) Standard deviation. (2)

(b) A discrete probability distribution function is given below;

X	1	2	3	4	5	6	7	8	9	10
P(X=x)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

- (i) Find $E[X]$ (5)
- (ii) Find $\text{var}[X]$ (4)
- (iii) Find $E(X^2)$ (4) **[25 Marks]**

Question three

(a) Events A and B are such that $P(A) = 5/12$ and $P(A \cap B) = 1/8$.

- (i) Find $P(B)$. (2)
- (ii) Find $P(B|A)$. (2)
- (iii) Are events A and B independent? (2)
- (iv) Are events A and B mutually exclusive? (2)

(b) Events A and B are such that $P(A) = 19/30$, $P(B) = 2/5$ and $P(A \cup B) = 4/5$.

Find $P(A \cap B)$. (2)

(c) Heart rate tests for 12 people were conducted to determine fitness levels. A higher score means a higher level of fitness. The heart rate, p beats per minute, and bleep scores, s , for the 12 people were recorded and coded, using $x = p - 60$ and $y = 10s - 50$. The results are illustrated below;

x	0	-6	9	-1	5	8	30	19	28	20	36	23
y	55	62	38	-7	50	44	8	8	3	20	-14	3

Showing workings, find the following;

- (i) Σx (2)
- (ii) Σy (2)
- (iii) Σx^2 (2)
- (iv) Σy^2 (2)
- (v) Σxy (2)
- (vi) Product Moment Correlation Coefficient (PMCC) between x and y . (4)
- (vii) Interpret the significance of the PMCC. (1)

[25 Marks]

Question four

(a) Given the following information;

ITEM	VALUE
Number of observations	$n = 40$
Mean	$\bar{x} = 175$
Standard deviation	$S = 20$
95% confidence interval	Z value 1.960

- (i) Find the confidence interval, with the aid of an example. (12)
(ii) Calculate the margin of error (3)

(b) Using examples, define the following terms;

- i) Mutually exclusive events (2)
ii) The p-value of a test (2)
iii) Independent events (2)
iv) Population (2)
v) Sample (2)

[25 marks]

Question 5

Results for a class of 20 students in Planning and in Design are shown below;

Course A	79	69	58	58	46	44	32	50	53	78
	81	61	61	45	31	44	53	66	47	57
Course B	52	58	68	77	38	85	43	44	56	65
	65	79	44	71	84	72	63	69	72	79

- (a) Use a **dual** stem and leaf diagram to compare the examination marks. (8)
(b) Using six classes, draw a frequency distribution graph for the results. (9)
(c) Construct a box and whisker plot of the data. (8)

[25 Marks]

Question 6

The following 25 figures represent the number of business trips taken annually by 25 property owners in Bulawayo: 33, 17, 2, 10, 12, 15, 22, 18, 20, 24, 8, 27, 8, 12, 17, 15, 21, 38, 16, 18, 10, 12, 9, 5, 28

- (i) Construct a frequency distribution table with 5 classes for this data. (6)
- (ii) Give the relative frequencies and construct a bar graph from the frequency distribution. (7)
- (iii) Construct a frequency polygon. (6)
- (iv) Construct a line graph representing frequency distribution. (6)

[25 Marks]