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

AUGUST 2024

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

SECTION A

Question one

i. Giving practical examples, describe the following terms;

    (a) Mutually exclusive events.   .   **[2]**

    (b) The p-value of a test.   **[2]**

    (c) Independent events.   **[2]**

    (d) Population   **[2]**

    (e) Sample   **[2]**

ii. Find the lower, middle, and upper quartiles for the data set below;
       20, 34, 17, 18, 28, 33, 12, 15, 17, 12, 41, 45, 18, 19, 16, 21, 26, 14, 26, 13, 29

                                                  [15]

SECTION B

Question two

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]

Question three

    (a) Tanyaradzwa Properties (Pvt) Ltd has set up a hotline to receive queries from clients. This hotline receives an average of 3 calls per day. Using Poisson's distribution, what is the probability that the hotline receives 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 calls in a day. **(7)**

(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]   **(6)**
(ii) Find var[X]   **(6)**
(iii) Find $E(X^2)$ **(6)**   **[25 Marks]**

Question four

(a) The number of typing errors made by a typist has a Poison distribution with an average of 4 errors per page. If more than 4 errors show on a given page, the typist must re-type the whole page. What is the probability that a certain page does not have to be re-typed?
(5)

(b) The mean time taken by a sample of 64 Pretoria-Jo'burg car commuters to commute to work was found to be 45 minutes with a variance of 256 minutes. Using a 95% confidence interval and z value of 1.960, calculate the margin of error.   **(6)**

(c) Events A and B are such that P(A) = 5/12 and P(A ∩ B) = 1/8.

(i) Find P(B).   **(5)**
(ii) Find P(B|A).   **(5)**
(iii) Are events A and B independent?   **(2)**
(iv) Are events A and B mutually exclusive?   **(2)**   **[25 Marks]**

Question five

 (a) Two fair coins are tossed.

(i) Illustrate the possible outcomes on a possibility space diagram. **(8)**

(ii) Find the probability that two heads are obtained. **(8)**

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

Find P(A ∩ B). **(4)**

(c) Given that a heart is picked at random from a pack of 52 playing cards, find the probability that it is a picture card. **(5)**   **[25 Marks]**

Question six

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) Determine the following for each course
       (i)   The mean   (1)
       (ii)   The median   (2)
       (iii)   The mode   (2)
   (b) Use a **dual** stem and leaf diagram to compare the examination marks.   **(5)**
   (c) Calculate for standard deviation of each course.   (5)

   (d) Using six classes, draw a histogram for the results.   **(5)**
   (e) Construct a box and whisker plot of the data.   **(5)**
[25 Marks]