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

OCTOBER 2024

This examination paper consists of 5 pages

Time Allowed: 3 hours

Total Marks: 100

Examiner's Name: K MAPONGA/A LUNGA

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

The average test score in a certain Property Studies Statistics class was 74% with a standard deviation of 8. The class had 2000 students.

Using the empirical rule,

i) Calculate and illustrate the percentage of students who scored less than 58% on a bell shaped distribution curve. (5)
ii) What is the probability that a student scored between 66% and 82% in this exam? (5) iii) In this exam, how many students scored at most 90%? (5) iv) Calculate and illustrate the percentage of the students who scored at least 66% on a distribution curve. (5)
v) Determine the number of students who scored more than 98% in the test. (5)

[25 marks]

SECTION B Question

two

a) A box contains 40 air vents for renovating the driveway at a property managed by a real estate company. Six of the air vents are defective. Two air vents are picked one at a time at random without replacement. What is the probability that:
(i) Both are defective   (5) (ii) One is defective (4)
(iii)   None is defective   (4)
b) A discrete probability distribution function is given below:

X	1	2	3	4
P(X=x)	0.1	0.4	0.2	0.3

(i) Find E(X)   (4) (ii) Find Var(X) (4)
(iii)   Find $E(X^2)$ (4)   [25 Marks]

Question three

The data in the table below represent the salaries to the nearest $1,000 of a random sample of 20 Real Estate Managers employed by the Real Estate Association of Zimbabwe:

560	920	430	740	780
700	410	970	720	720
620	680	890	840	620
710	690	910	640	570

(i)   Using the data, calculate the following:

(a) Mean   (3)

(b) Median (3)

(c) Mode   (3)

(d) Standard deviation (6)

(ii) Clearly explaining,

a) Draw a histogram of the data (5)
b) Construct a box and whisker plot of the data. (5)

[25 marks]

Question four

(a) Giving an example of each, 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)

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(vi)   Standard deviation.   (2)

(b) Bleep tests were used to measure property owners' fitness. A higher score means a higher level of fitness. The heart rate, p beats per minute, and bleep score, s, for 12 people were recorded and coded, using $x = p - 60$ and $y = 10s - 50$. The results are illustrated bellow;

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 (1)
(ii) Σy (1) (iii) Σx^2 (1)
(iv) Σy^2 (1) (v) Σxy (1)
(vi)   Product Moment Correlation Coefficient (PMCC) between x and y.   (7)
(vii)   Interpret the significance of the PMCC.   (1)

[25 Marks]

Question five

(a) The number of typing errors made by a typist has a Poisson 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 $P(A \cap B) = 1/8$.

(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 six

(a) Given the following information;

ITEM	VALUE
Number of observations	n = 40
Mean	x̄ = 175
Standard deviation	S = 20
95% confidence interval	Z value 1.960

(i)   With the aid of an example, find the confidence interval.   (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]

END