



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECOND YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 212 PROBABILITY & STATISTICS FOR COMPUTER SCIENCE

DATE: 10/8/2021

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS) COMPULSORY

- (a) Explain the meaning of the following terms as applied in Statistics
- Population
 - Sample (4 marks)
- (b) Differentiate between EACH of the following terms:
- Discrete and continuous variable (2 marks)
 - Point and interval estimation (2 marks)
- (c) Consider the probability distribution of a discrete variable below

X	8	12	16	20	24
P(X=x)	$\frac{1}{8}$	$\frac{1}{6}$	-	$\frac{1}{4}$	$\frac{1}{12}$

- Determine
- $\Pr(x = 16)$ (3 marks)
 - the mean of the distribution (3 marks)

- (d) Given that x is a continuous random variable with a density function defined as

$$f(x) = \begin{cases} ce^{-2x}, & x > 0 \\ 0, & \text{elsewhere} \end{cases}$$

Calculate the value of c and hence the mean of x . (7 marks)

- (e) A set of cards, identical in size and shape, is numbered 1 to 15 inclusive. A card is drawn at random from the pack and its number n is noted

A is the event: n is prime

B is the event: $n \leq 10$

Calculate (i) $P(A)$, (ii) $P(B)$, (iii) $P(A \cap B)$ (4 marks)

- (f) In the course of an audit in a computer assembling company it was found that from a simple random sample of 200 bad debts that the mean debt was £48.50 with a standard deviation of £6.50. Construct a 99% confidence interval for the mean debt. (5 marks)

QUESTION TWO (20 MARKS)

- (a) A random variable x has a probability function given by

$$f(x) = \begin{cases} ke^{-x}, & 0 \leq x \leq 1 \\ 0, & \text{elsewhere} \end{cases} \quad \text{Where } k \text{ is a constant, Determine}$$

- (i) The value of k (5 marks)

- (ii) Probability that $x > \frac{3}{4}$ (5 marks)

- (b) A continuous random variable x has a probability density function $f(x)$ given by

$$f(x) = \begin{cases} 6\left(x^{\frac{1}{2}} - x\right), & \text{for } 0 \leq x \leq 1 \\ 0, & \text{elsewhere} \end{cases}$$

Calculate the first and the second moments hence find the variance of x . (10 marks)

QUESTION THREE (20 MARKS)

- (a) Explain the meaning of the following terms as used in probability theory:

- (i) An event
- (ii) Random experiment
- (iii) Mutually exclusive events
- (iv) Independent events (8 marks)

- (b) The weights in pounds of a group of people signing up at a health club are

135, 175, 166, 148, 183, 206, 190, 128, 147, 156, 166, 174, 158,
196, 120, 165, 189, 174, 148, 225, 192, 177, 154, 140, 180, 172

- (i) Tabulate a frequency distribution table with class intervals by 120-134, ... etc. (6 marks)
- (ii) Use the table in 3(a) above to calculate the quartile deviation (6 marks)

QUESTION FOUR (20 MARKS)

- (a) The number of deaths by suicide in a certain city is a Poisson process with parameter $\lambda=2$ per day. Let x be the number of deaths by suicide per day. Determine
- (i) $P(x=0)$ (3 marks)
 - (ii) The number of accident free days in the city in the year 2006. (3 marks)
 - (iii) $p(x \geq 3)$ (4 marks)
- (b) A college collects the following set of data on the number of credits that a randomly selected groups of students obtain and the number of hours they work during the week as shown below:

Number of credits	20	25	30	50	20	23
Number of hours worked	12	13	12	15	16	16

Calculate the equation of regression line for the number of credits as a function of the number of hours worked during the week. (10 marks)

QUESTION FIVE (20 MARKS)

- (a) The following frequency distribution the median is 59.5 and the ninetieth` percentile is 79.5

Determine the values of a , b and c

<u>CLASS</u>	<u>FREQUENCY</u>
30 – 39	14
40 – 49	a
50 – 59	40
60 – 69	b
70 – 79	19
80 – 89	c

$$\sum f = 150 \quad (10 \text{ marks})$$

- (b) Suppose we have the following data on Age versus the price of Desktop computers

Age	5	7	6	6	5	4	7	6	5	5	2
Price	80	57	58	55	70	88	43	60	69	63	118

- (i) Determine the correlation coefficient between age and price of desktop computer (8 marks)
- (ii) Comment on the results obtain in (i) above. (2 marks)