



MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

SECOND YEAR SUPPLEMENTARY EXAMINATIONS FOR

BACHELOR OF SCIENCE COMPUTER SCIENCE

SCO 212 PROBABILITY & STATISTICS FOR COMPUTER SCIENCE

DATE: 23/7/2019

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
- i. Population
 - ii. Sample
 - iii. Data (3 marks)
- b) Differentiate between EACH of the following terms:
- i. Discrete and continuous variable (2 marks)
 - ii. Point and interval estimation (2 marks)
- c) Consider the probability distribution of a discrete variable below

X	1	2	4	5	8
P(x=x)	0.2	0.25	0.15	-	0.1

- Determine
- (i) $\Pr(x = 5)$ (3 marks)
 - (ii) 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) In a random sample of 64 customers in a computer service company, the mean waiting time for being served is 3 minutes with a standard deviation of 1.5 minutes. Construct a 99% confidence interval for the average waiting time in the company. (5 marks)
- f) The result of an experiment is a discrete random variable which has the binomial distribution with mean 1.2 and variance 1.08. Calculate the value of the sample size (5 marks)

QUESTION TWO (20 MARKS)

- a) A TV network is concerned about the high cost of producing many of its programs. A study is conducted to relate the production costs for 30 minutes of programming (in hundreds of thousands of dollars) to the ratings that the program gets in the national ratings survey. The results are shown below:

Production cost	1.2	1.6	1.8	2.5	2.7	3.0	3.5	4.4
Ratings	3.3	3.9	5.7	4.2	4.5	8.2	6.1	4.6

Calculate the correlation coefficient for the ratings and the production cost. (8marks)

- b) The pdf of a random variable is given by

$$f(x) = \begin{cases} \frac{1}{4}, & x = 0, 2 \\ \frac{1}{2}, & x = 1 \\ 0, & \text{elsewhere} \end{cases}$$

- i) Determine the moment generating function for x. (4 marks)
- ii) Hence use it to calculate the mean and variance. (8 marks)

QUESTION THREE (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

$$\sum f = 150$$

(10 marks)

- b) Past records suggest that the heights of graduates of a certain college (at the time of their graduation) fit a normal distribution with mean 165 cm and standard deviation 6 cm. Use this information to determine:-
- (i) The percentage of graduates whose heights is less than 170 cm . (4 marks)
 - (ii) The percentage of graduates whose heights is between 170 cm and 175 cm. (6 marks)

QUESTION FOUR (20 MARKS)

- a) 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. (8 marks)

- b) The following are the speed, in miles per, of a group of cars on a high-way as measured with radar gun
- 58,62,59,53,61,55,57,54,59,53,66,60,58,60,61,58,56,60,58,62,57,55,53,55,61,57,52,58,49,
- 54,52,55,57,60,64,67.
- i) Construct a frequency distribution table with class interval by 45-49,...etc (6 marks)
 - ii) use the table in (i) above to calculate the quartile deviation (6 marks)

QUESTION FIVE (20 MARKS)

- a) The mean number of strikes in a particular industry was found to be 1.2 per week. Determine the probability that during a given week there will be:
- (i) No strikes (2 marks)
 - (ii) More than 2 strikes (4 marks)
 - (iii) Exactly 4 strikes (3 marks)

- b) The following table shows the number of rooms in dwellings in Mombasa county in 2004

No. of rooms	Percentage of dwellings
1	1
2	2
3	8
4	21
5	33
6	26
7	5
8 or more	<u>4</u>
	<u>100</u>

- i) Calculate the mean and standard deviation of the above distribution. (7 marks)
- ii) Assuming that the data is based on a simple random sample of 8120 dwellings. Calculate the 95% confidence interval for the mean number of dwellings in Mombasa County (5 marks)