



MACHAKOS UNIVERSITY

University Examinations 2017/2018

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

SECOND YEAR FIRST SEMESTER EXAMINATIONS FOR
BACHELOR OF SCIENCE COMPUTER SCIENCE

SCO 212: PROBABILITY & STATISTICS FOR COMPUTER SCIENCE

DATE:15/12/2017

TIME: 8.30-10.30 AM

INSTRUCTIONS:

Answer question ONE and any other TWO questions

QUESTION ONE (COMPULSORY) (30Marks)

- (a) Explain the meaning of the following terms as applied in Statistics
- i. Population
 - ii. Data (4 marks)
- (b) Differentiate between EACH of the following terms as applied in statistics
- i. Descriptive and inferential statistics (2 marks)
 - ii. 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
- (i) $\Pr(x = 16)$ (3 marks)
 - (ii) the mean of the distribution (3 marks)

- (d) The data given below represents the frequency distribution of marks scored in mathematics by 250 students.

Grade scored	1	2	3	4	5	6	7	8
No. of students	8	20	36	64	48	40	24	10

Determine each of the following measures about the distribution

- i) Median
 - ii) Mean
 - iii) Standard deviation (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 95% confidence interval for the average waiting time in the company. (5 marks)
- (f) A number is chosen at random from the numbers 1,2,...30. Determine the probability that it is:
- i) divisible by 3
 - ii) divisible by 4
 - iii) divisible by both 3 and 4
 - iii. divisible by 4, given that it is divisible by 3. (4 marks)

QUESTION TWO (20 MARKS)

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

- i) Calculate the correlation coefficient between the ratings and the production cost. (10 marks)
- ii) Interpret the results in (i) above (2 marks)

- iii) Determine the least squares regression equation relating the ratings to the production costs (6 marks)
- iv) Using the regression line obtained in (iii) above estimate the ratings when the costs is 6.5 dollars. (2 marks)

QUESTION THREE (20 MARKS)

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

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

Calculate the first two moment hence find the variance. (8 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 . (6 marks)
 - (ii) The percentage of graduates whose heights is between 170 cm and 175 cm. (6 marks)

QUESTION FOUR (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
- (i) Independent events (8 marks)

- (b) The following are the heights in meters achieved by athletes competing in the pole vault event in a track and field

competition: 5.2, 5.6, 4.9, 5.3, 5.8, 4.8, 5.0, 5.2, 5.4, 4.8, 4.4, 5.1, 5.5, 4.9, 5.2, 5.7, 5.0, 5.3, 4.9, 4.8

- (i) Construct a frequency distribution table with class interval by 4.4-4.6,...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 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) $P(x=0)$ (2 marks)

(ii) The number of accident free days in the city in the year (2 marks)

(iii) $P(x \geq 3)$ (6 marks)

(b) The following table shows the number of household members in certain town in 2010

No of House hold Members	Percentage
1	18
2	32
3	20
4	19
5	7
6or more	4

i) Calculate the mean and standard deviation of the number of households.

(5 marks)

ii) Assuming the data is based on a single random sample of 445; calculate a 95% confidence interval for the mean household size.

(5 marks)