KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

MAIN CAMPUS

SECOND SEMESTER 2018/2019 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION ARTS

MATH 123: PROBABILITY AND STATISTICS 1

STREAM: Y1 S3 PART TIME   **TIME: 3:00-5:00PM**

EXAMINATION SESSION: APRIL   **DATE: 10/04/2019**

VENUE: SKILLS LAB   **COPIES:25**

INSTRUCTIONS:

> ➤ **Answers question ONE and any other TWO questions.**

QUESTION ONE (30MARKS)

a) Define a binomial distribution.   (4marks)
b) The time rats take to pass through a maze are recorded in the table below. Calculate arithmetic mean, geometric and harmonic mean from the following distribution.   (10marks)

Time (sec)	10 - 14	15 - 19	20 - 24	25 – 29	30 - 34	35 - 39
freq	3	11	19	22	6	2

c) Determine the mean, the variance and the standard deviation of the following discrete distribution. (8marks)

X	0	1	2	3	4	5	6	7
P(X)	0.103	0.118	0.246	0.229	0.138	0.094	0.071	0.001

d) Obtain Karl Pearson's measure of skewness for the following data. (8marks)

X	5 - 9	10 - 14	15 - 19	20 - 24	25 - 29	30 - 34	35 - 39
freq	6	8	17	21	15	11	2

QUESTION TWO (20MARKS)

a) Consider the grouped distribution in the table below. Use it to calculate the mode and median.

Marks	30-39	40-49	50-59	60-69	70-79
No. of students	2	9	14	7	8

(6marks)

b) Calculate the first 4 moments of the following distribution about the mean hence find

β_1 and β_2 and comment on the skewness of the distribution.
(14marks)

X	0	1	2	3	4	5	6
Freq.	1	8	12	10	9	6	2

QUESTION THREE (20MARKS)

a) The following data represents the maximum temperature in ^{o}c predicted for some major word cities.

17   25   21   18   14   15   24   22   15   21   35

17   25   15   18   17   29   16   24   39   30   23

23   27   43   28   29   15   15   19   32   30   32

23   13   18   13   27   32   17   17   25   25   30

20   18   17   33   28   27   26   32   32   33   19

Calculate;

(i) the range. (1mark)

(ii) the number of classes and class size. (4marks)

(iii) using the number of classes and the class size in (ii) prepare a grouped frequency distribution and use it to calculate mean, mode, variance and standard deviation. (12marks)

Assuming the scores for the 55 candidates in (a) above are normally distributed with the mean and standard deviation obtained, estimate the number of students who scored more than 48%. (3marks)

QUESTION FOUR (20MARKS)

a) Define kurtosis. (2marks)

b) With the aid of diagrams describe three types of kurtosis. (6marks)

c) Comment on the kurtosis of the following distribution. (12marks)

Class	0 - 9	10 - 19	20 - 29	30 - 39
Freq.	1	3	4	2

QUESTION FIVE (20MARKS)

a) The table below shows a frequency distribution for the final marks in a mathematics examination.

Marks	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 70	80 - 89	90 - 99
No. of pupils	3	6	5	11	4	3	2	3	2	1

Find

  (i) Mode (3marks)

  (ii) Median (3marks)

  (iii) 2nd and 7th deciles. (4marks)

  (iv) 21st and 49th percentiles . (4marks)

b) A bag contains 8 black balls and 5 white ones. If three balls are drawn from the bag one at a time, find the probability of drawing balls of different colours,

(i) Without replacement. (3marks)

 (ii) With replacement
 (3marks)

KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS
MAIN CAMPUS

FIRST SEMESTER, 2017/2018 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
ARTS/SCIENCE, COMPUTER SCIENCE, ECON MATH, ECON STAT, ACTURIAL
SCIENCE, TELECOMMUNICATIONS,

MATH 123: PROBABILITY AND STATISTICS 1

STREAM: [Y1S2]   **TIME: 2.00-4.00 PM**

EXAMINATION SESSION: DECEMBER   **DATE: 11/12/2017**

VENUE: AUDIT   **COPIES: 250**
INSTRUCTIONS:

➢ **Answers question ONE and any other TWO questions.**

QUESTION ONE   **(30MARKS)**

a) Define statistics as a ;

 (i) Numerical data.   (2marks)

 (ii) Statistical methods.   (2marks)

b) State three limitations of statistics.   (3marks)

c) Discuss three methods of sampling techniques used in statistics.   (6marks)

d) The frequency distribution given below shows the weekly wages of workers in a sisal farm.

Wages (ksh)	50 - 69	70 - 89	90 - 109	110 - 129	130 - 149	150 - 169	170 - 189
No. of workers	40	80	120	200	60	70	30

Compute   (i) The mean wages.   (4marks)

      (ii) The median.   (3marks)

      (iii) The mode.   (3marks)

      (iv) The standard deviation.   (5marks)

d) The nicotine content in a certain brand of king-size cigarettes has normal distribution with mean content of 1.8mg. and a standard deviation of 0.2mg. Find the probability that the nicotine content of a randomly picked cigarette of this brand will be less than 1.45mg.   (2marks)

QUESTION TWO   (20MARKS)

a) Calculate the geometric mean and harmonic mean of the following observations.

  3 , 5 , 6 , 10 , 12.   (6marks)

b) Calculate the first 4 moments of the following distribution about the mean hence find

β_1 and β_2 (14marks)

X	0	1	2	3	4	5	6
Freq.	1	8	12	10	9	6	2

QUESTION THREE   (20MARKS)

a) The number of workers in three sections of a factory, mean monthly salaries for each category with their respective standard deviation are given below. Find their combined mean monthly salaries and combined standard deviation.   (9marks)

section	No. of workers employed	Mean wages Ksh.	Standard deviation In Ksh.
A	50	1113	60
B	60	1120	70
C	90	1115	80

  b) The following data relate to the age of employees and the number of days they were reported sick in a month.

Employee	1	2	3	4	5	6	7	8	9	10
Age (x)	30	32	35	40	48	50	52	55	57	61

Sick days (y)	1	0	2	5	2	4	6	5	7	8

Calculate the Karl Pearson's product moment coefficient of correlation and interpret it.

(11marks)

QUESTION FOUR **(20MARKS)**

a)Define kurtosis. (2marks)

b) With the aid of diagrams discuss three types of kurtosis. (6marks)

c) Comment on the kurtosis of the following distribution. (12marks)

Class	0 - 9	10 - 19	20 - 29	30 - 39
frequency	1	3	4	2

QUESTION FIVE (20MARKS)

a) The distribution of scores in a statistics test for a group of 100 candidates were as follows.

Marks	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59
No. of students	5	15	40	35	5

Estimate correct to 2d.p. the

(i) Mean mark (3marks)

(ii) Standard deviation. (3marks)

b) Assuming the scores for the 100 candidates in (a) above are normally distributed with the mean and standard deviation obtained, estimate the number of students who scored more than 48%. (3marks)

c) Use the graph paper provided to construct a histogram to represent the data. (3marks)

d) A bag contains 3 black balls and 6 white balls. If two balls are drawn from the bag one at a time, find the probability of drawing a black ball and a white ball.

(i) without replacement. (4marks)

(ii) with replacement. (4marks)

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UNIVERSITY EXAMINATIONS

MAIN CAMPUS

SECOND SEMESTER 2016/2017 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION
ARTS/SCIENCE

MATH 123: PROBABILITY AND STATISTICS 1

STREAM: SBL   **TIME:**

EXAMINATION SESSION: AUGUST   **DATE:**

INSTRUCTIONS:

> ➢ **Answer question ONE and any other TWO questions.**

QUESTION ONE (30MARKS)

a) Define the following statistical terms,

  (i) Population   (2marks)

  (ii) Sample   (2marks)

  (iii) Parameter   (2marks)

  (iv) Variable   (2marks)

b) List two advantages and two disadvantages of the arithmetic mean.   (4marks)

c) The table below shows the number of calls per day received by a fire station over a given year. Determine the median of this distribution.   (3marks)

No. of calls	0	1	2	3	4	5	6
No. of days	139	102	57	30	19	12	6

d) Define skewness in regard to distribution in statistics. State two types of skewness. (2marks)

e) Calculate the geometric mean of the following observations,   (4marks)

  3 , 5 , 6 , 10 ,12.

f) Use the table below to calculate Karl Pearson's coefficient of skewness of the two samples.(5marks)

Measures	Place A	Place B
Mean	42.83	67
Median	43.5	69
Standard Deviation	12.48	10.98

g) Define the following terms.

(i) Sample space (2marks)

(ii) Mutually exclusive events (2marks)

QUESTION TWO (20MARKS)

a) The probability that a small kid will be alive in 40 years is ¾ and the probability that its mother will be alive in 40 years is 4/5. Find the probability that at least one of the two will be alive in 40years.

(3marks)

b) The probability for the number of customers per day at a coffee shop is shown below,

No. of customers (X)	50	51	52	53	54
Probability P(X=x)	0.1	0.2	0.37	0.21	0.12

Find

(i) The mean, E(X) (3marks)

(ii) The variance , Var(X) (3marks)

(iii) The standard deviation of X (3marks)

c) A committee of three people is to be chosen at random from three men and two women. What is the probability that,

(i) All the three chosen are men (2marks)

(ii) One of the chosen three people chosen is a woman. (2marks)

d) A fair coin is tossed three times. Find the probability of getting a head in the third throw given that the first two tosses are heads. (4marks)

QUESTION THREE (20MARKS)

a) Define a binomial probability distribution. (5marks)

b) The following are the wages in K£ of a group of people in a firm.

Weekly wages	501-550	551-600	601-650	651-700	701-750	751-800
No. of people (f)	120	60	25	20	15	8

Calculate

   (i) Median wage (3marks)

   (ii) Mean wage (3marks)

   (iii) Mode (3marks)

   (iv) Variance (4marks)

   (v) Standard deviation (2marks)

QUESTION FOUR (20MARKS)

a) Consider the following distribution for marks of 70 students,

Marks	30.34	35-39	40-44	45-49	50-54	55-59
No. of students	5	10	15	30	5	5

   (i) Construct less than cumulative frequency curve. (3marks)

   (ii) Using the cumulative curve above , estimate the median , quartile deviation and the 31st percentile. (10marks)

b) Calculate the Karl Pearson's correlation coefficient between the heights of mother and her daughter from the data below and comment on the results. (7marks)

Height of mother X	65	66	67	68	69	70	71	72
Height of daughter Y	67	68	65	68	72	72	69	71

QUESTION FIVE (20MARKS)

a) Define a Poisson distribution of a random variable (5marks)

b) Find the first four moments about the mean of the following data,

1 , 2 , 4 , 6 , 7 (8marks)

c) Calculate the kurtosis using the following frequency distribution and comment on the results.(7marks)

Class interval	0-9	10-19	20-29	30-39
Frequency	1	3	4	2

KABARAK   UNIVERSITY

UNIVERSITY EXAMINATIONS

SECOND SEMESTER 2017/2018 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF BACHELOR OF ACTUARAL SCIENCE, COMPUTER SCIENCE, ECONOMICS MATHEMATICS, MATHEMATICS AND STATISTICS, COMPUTER AND FORENSIC, TELECOMMUNICATION AND EDUCATION.

MATH 123: PROBABILITY AND STATISTICS 1

STREAM: Y1S2   **TIME: 11.00-1.00 PM**

EXAMINATION SESSION: JAN-APRIL   **DATE: 2/04/2019**

INSTRUCTIONS:

➢ Answer **questions ONE and any other TWO**.

➢ Indicate question numbers clearly at the top of each page and show working methods clearly.

➢ Observe further instructions on the answer booklet.

QUESTION ONE (30 MARKS)

a) The Random variable X, is distributed such that X~ B(7,0.2). Find

 i)   P(X=3)   **(2 marks)**

 ii) P(X$>$ 1)   **(3 marks)**

b) Find the first four central moments about the mean of the following data.   **(8 marks)**

X	2	2.5	3	3.5	4	4.5	5
Freq	5	38	65	92	70	40	10

c) Obtain Median, Arithmetic Mean, Harmonic Mean, Geometric Mean and Quartile

Deviation of the data below. **(12 marks)**

X	1	2	3	4	5	6	7	8	9
Freq	8	10	11	16	20	25	15	9	6

d) Use the probability distribution table below to calculate mean and standard deviation.

(5 marks)

X	0	1	2	3
P(X)	⅛	⅜	⅜	⅛

QUESTION TWO (20 MARKS)

a) A researcher carried out a study on the number of miles the students traveled on campus

each day and found the following,

```
1    2    6    7    12   13   2    6    9    5
1    7    3    15   15   4    17   1    14   15
4    16   4    5    8    6    15   18   15   2
9    11   12   1    9    2    10   11   4    10
9    18   8    8    4    14   7    3    2    6
```

Use the data to prepare a frequency distribution of six classes and use it to find ;

i)   Median   **(3marks)**

ii)   Lower and upper quartile   **(5marks)**

iii)   Semi-interquatile deviation   **(2marks)**

b) Define a Poisson Distribution   **(2marks)**

c) Suppose bank customers arrive randomly on weekly afternoons at an average of 3.2 customers every 4 minutes. What is the probability of:

i) Exactly 5 customers arriving in a 4-minute interval on a weekday afternoon?

(4 marks)

ii) Having more than 7 customers in a 4-minute interval on a weekday afternoon?

(4 marks)

QUESTION THREE **(20 MARKS)**

a) From the information below, calculate Karl Pearson's coefficient of the skewness.

[10 marks]

Measures	Place A	Place B
Mean	256.5	240.8
Median	201.1	201.6
Standard deviation	215.0	181.0

b) From the prices of shares of X and Y below find which one is more stable in value.

X	35	54	52	53	56	58	52	50	51	49
Y	108	107	105	105	106	107	104	103	104	101

[10 marks]

QUESTION FOUR (20 MARKS)

a) A collar manufacturer is considering the production of a new style of collar to attract young men. The following statistics of the neck circumference are available based on the measurements of a typical group of students.

Mid-values(m)	12.5	13	13.5	14	14.5	15	15.5	16	16.5
No. of students	4		19	30	63	66	29	18	1	1

Compute the mean , median and standard deviation. **(10mks)**

b) A group of 80 students scored the following marks in a test;

Marks	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of students	2	3	5	9	10	22	24	3	2

    i) Draw an ogive and use it to; **(3marks)**

    ii) Find the number of students who failed if the pass mark was 40%. **(2marks)**

    iii) (ii) If the pass mark was lowered by the external examiner to 35% how many more students passed their exam. **(2marks)**

c) A bag contains 30 tickets numbered from 1 to 30 . One ticket is drawn at random . What is the probability that it is divisible by three or five? **(3marks)**

QUESTION FIVE **(20 MARKS)**

a) Define kurtosis **(2 marks)**

b) With the aid of diagrams discuss three types of kurtosis **(9 marks)**

c) The first four central moments of a distribution are 0 , 16 , -36 , and 120. Comment on the kurtosis of the distribution . **(3 marks)**

d) Discuss the following basic concepts as used in probability **(6 marks)**

    i) Sample space
    ii) Mutually exclusive events
    iii) Independent events

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As members of Kabarak University family, we purpose at all times and in all places to set apart in one's heart, Jesus as Lord.
(1 Peter 3:15)

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KABARAK   **UNIVERSITY**

UNIVERSITY EXAMINATIONS
MAIN CAMPUS

SECOND SEMESTER, 2016/2017 ACADEMIC YEAR

EXAMINATION FOR THE DEGREE OF SCIENCE IN COMPUTER SCIENCE; ECONOMICS AND MATHEMATICS/STATISTICS; ACTUARIAL SCIENCES; BED(SC) BED(A); TELECOMUNICATION AND FORENSIC SCIENCE

MATH 123: PROBABILITY AND STATISTICS I

STREAM: [Y1S2 AND Y2S1]   **TIME: 2.00-4.00 PM HOURS**

EXAMINATION SESSION: APRIL   **DATE: 18/042017**

INSTRUCTIONS

> ➢ Instructions to candidates: Answer **QUESTION ONE** and any other **TWO** questions
> ➢ Do not write on the answer sheet
> ➢ Follow instructions that are given to the answer sheet

QUESTION ONE   [30 Marks]

a) Define parameter, statistics , variable, census   **[4 marks]**

b) What do you understand by skewness? Explain its use and how it is calculated. Highlight its important properties   **[6 marks]**

c) Use table below to calculate Karl Pearson Coefficient of skewness of the two samples.   **[6 marks]**

Measures	Place A	Place B
Mean	28.5	27.8
Median	25.1	24.6
Standard Deviation	2.15	1.81

d) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random with replacement and without replacement. Find the probabilities among the balls drawn that there is at least one ball of each colour. **[4 marks]**

e) Calculate the inter quartile range of the following data. **[4 marks]**

33, 44, 29, 63, 81, 84, 16, 57, 29, 76.

f) State the axiom of probabilities **[4 marks]**

g) 'A' travelled some distance by cycle at a speed of 15 km per hour. On return journey he travelled the same distance at a speed of 12 km per hour. What was his average speed per hour? **[2 marks]**

QUESTION TWO   [20 Marks]

a) Calculate the first 4 moments of the following distribution about the mean and hence β_1 and β_2 **[14 marks]**

X	0	1	2	3	4	5	6
Freq	2	8	12	11	9	6	2

b) Outline research procedure cycle one has to follow for a credible study as taught to you in this course **[6 marks]**

QUESTION THREE [20 Marks]

a) Find the geometric mean, harmonic mean, arithmetic mean, mode, median and coefficient of mean deviation of the following data **[14 marks]**

Class intervals	0-5	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	1	2	5	14	10	9	2

b) Show that the sum of squares of the deviations of a set of values is minimum when taken from the mean; i.e. show that if $Z = \sum f_i (x_i - A)^2$ is minimum if $A = \bar{x}$

[3 marks]

c) Let $d_i = \dfrac{(x_i - A)}{c}$ where i=1, 2, …. n; A is an arbitrary point of random sample $x_1, x_2, ..., x_n$, and c is the common magnitude of the intervals show that the sample mean is, $\bar{x} = A + \dfrac{c}{n} \sum d_i$ **[3 marks]**

QUESTION FOUR   [20 Marks]

a) The table below show the frequency distribution of masses (kg) of 60 students in a college

Masses (kg)	40-44	45-49	50-54	55-59	60-64	65-69	70-74
No of students	2	5	7	18	20	5	3

   i)   Draw an ogive   **[1 mark]**

   ii)   How many students were of mass less than 57 kg?   **[2 marks]**

   iii) How many students were of mass greater than 61 kg?   **[2 marks]**

   iv)   What is the mass exceeded by 20% of the students?   **[2 marks]**

b) The probability distributions for the number of customers per day at a coffee shop is shown below.   **[10marks]**

No. of customers	40	41	42	43	44
Probability P(x)	0.1	0.21	0.37	0.20	0.12

   Find
   i)   The mean, E (X)   **[3 marks]**
   ii)   The variance, Var(X)   **[4 marks]**
   iii) The standard deviation of X   **[1 mark]**

c) Two cards are drawn at random from a pack. Find the probability that they are:
   i)   Both Kings
   ii)   Both spades   **[5 marks]**

QUESTION FIVE   [20 Marks]

a) Define kurtosis and how is it used   **[5 marks]**

b) With the aid of diagrams discuss three types of kurtosis.   **[7 marks]**

c) A piece of equipment will function only when all the three components A, B and C are working. The probability of A failing during one year is 0.15, that of B failing is 0.05 and that of C failing is 0.10. What is the probability that the equipment will fail before the end of the year?   **[8 marks]**

As members of Kabarak University family, we purpose at all times and in all places, to set apart in one's heart, Jesus as Lord. (1 Peter 3:15)

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