**KABARAK  UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**MAIN CAMPUS**

**SECOND SEMESTER 2018/2019 ACADEMIC YEAR**

**EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION ARTS/SCIENCE**

**MATH 123: PROBABILITY AND STATISTICS 1**

**STREAM: PART TIME TIME:**

**EXAMINATION : DATE:**

**INSTRUCTIONS:**

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

**QUESTION ONE (30MARKS)**

1. Define a binomial distribution . (4marks)
2. 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

1 and 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 oc 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)