The Open University of Sri Lanka

B.Sc/B.Ed. DEGREE, CONTINUING EDUCATION PROGRAMME

No Book Test (NBT) 2024/2025

Level 05 - Applied Mathematics

ADU5318 - Bio Statistics

Date: 22.03.2025   **4.00 p.m. to 5.00 p.m.**

Instructions

- This examination is of **one-hour** duration.
- Answer **all** questions.
- The examination paper has two parts. Part *A* consists of 10 multiple choice questions. Pat *A* is allocated 40 marks and Part *B*, consisting of a structured essay type question is allocated 60 marks, distributed as indicated.
- **Detach Part *A*, underline the most appropriate answer to each question in this section, and return along with the answers to Part *B*.**
- Non programmable calculators are permitted.

Part A

1) Which of the following statements is correct about a relative cumulative frequency table?

   a) The relative cumulative frequency for the lowest class is always equal to 0.

   b) The relative cumulative frequency for any class is the sum of the relative cumulative frequencies for all previous classes.

   c) The relative cumulative frequency for a class is equal to the proportion of observations in the data set, belonging to that class.

   d) The relative cumulative frequency for the highest class is always equal to 1.

2) The mean and standard deviation of sugar amounts in 10 samples of a soft drink are 10 grams and 2 grams respectively. If 1 gram of sugar is added to each sample, the new mean and standard deviation of the ten samples are:

   a) 10 grams and 2 grams

   b) 10 grams and 4 grams

   c) 12 grams and 2 grams

   d) 12 grams and 4 grams

respectively.

3) The first quartile, second quartile and the third quartile of a set of data values are 32, 49 and 56 respectivly. The most appropriate statement is:

   a) The data were sampled from a distribuition that is symmetric.

   b) The data were sampled from a distribution that is positively skewed.

   c) The data were sampled from a distribution that is negatively skewed.

   d) The data were sampled from a distribution that is bimodal

4) Which of the following combination of graphs is most appropriate for displaying the distribution of nominal data?
   a) Histogram
   b) Box and Whisker plot
   c) Bar chart
   d) Line graph

5) Which of the following statements about a box and whisker plot is **incorrect**?
   a) The whiskers in a box and whisker plot always extend to the largest and smallest values in the data set.
   b) The box and whisker plot displays the inter-quartile range of the data.
   c) The box and whisker plots display extreme observations in the data
   d) The box and whisker plots can be used to examine whether the data are symmetrically distributed or not.

6) Which of the following statements about the inter-quartile range is correct?
   a) The inter-quartile range is **always** smaller than the range.
   b) The inter-quartile range is **not affected** by extreme observations in a data set.
   c) The inter-quartile range is always a suitable measure for ordinal data.
   d) The inter-quartile range is always an appropriate measure to compare the dispersions of data collected on two variables.

7) Which of the following graphs is not suitable for examining the presence of extreme data values in a data set.
   a) Frequency polygon
   b) Histogram
   c) Cumulative frequency plot
   d) Stem-and-Leaf plot

8) Which of the following statements about the mode is **incorrect**?
   a) The mode is always less than the median of the data
   b) The mode is a suitable measure for nominal data
   c) The mode is a measure of central tendency.
   d) When all data values are multiplied by a constant, the value of the mode changes.

9) Which of the following is the most reliable measure of dispersion when the data follow a skewed distribution?
   a) Range
   b) Standard deviation
   c) Mean absolute deviance
   d) Inter-quartile range

10) Which of the following statement is correct about the coefficient of variation.
   a) The coefficient of variation is appropriate when data follow a skewed distribution.
   b) The coefficient of variation is appropriate when there are extreme values in the data set.
   c) When each data value is multiplied by a constant, the coefficient of variation remain unchanged.
   d) When a constant is added to each data value, coefficient of variation remain unchanged.

Part B

2) A researcher interested in studying the effect of a food preservative on the shelflife of dried coconut milk powder, added 2mg of a food preservative to coconut milk powder samples of 100 grams each and measured the shelf life (in weeks). As a control, shelflife was also measured on coconut milk power samples without adding the preservative. The data collected are summarised in the following table.

Shelflife (Weeks)	Amount of preservative added	
	0 mg	2 mg
3 - 4	11	22
4 - 5	22	44
5 - 6	68	24
6 - 8	24	64
8 - 10	04	40
10 - 12	01	22
Total	130	216

a) Consider the shelflife measured on samples that had received no preservative.

   i) Propose four statistics that can be used to estimate the mean shelflife when the preservative is not added.

   (05 marks)

   ii) Give one advantage and one disadvantage of using each of the statistics you proposed in part (i).

   (15 marks)

   iii) Among the statistics you proposed in part (i), choose the most appropriate statistic for this data, and estimate the mean shelflife, when the preservative is not added. Give reasons for your choice of the statistic.

   (20 marks)

b) Construct a graph that can be used to examine the effects of the addition of preservative on the shelflife of the coconut milknpowder. Report all findings one can make from the graph you constructed.

   (20marks)

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