BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF COMMERECE

DEPARTMENT OF ECONOMICS

PROGRAMME: BSc HONORS IN ECONOMICS

STATISTICS FOR ECONOMCS 1 EC103 (3)

DURATION: 3 HOURS TOTAL MARKS: 100

INSTRUCTIONS TO CANDIDATES

(i) Answer all questions.

(ii) Each question carries **25 marks.**

(iii) Start each answer on a new page.

(iv) No cell phones are allowed into the examination room.

QUESTION 1

The following are kilometers travelled by lectures when supervising students in Bindura:

Class interval	25- 40	40 - 55	55 - 70	70 - 85	85 - 100	100 - 115	115 - 130
Frequency	5	7	6	17	14	7	8

a) Calculate

(i) The Mean [3 Marks]

(ii) The Mode [3 Marks]

(iii) The Median [3 Marks]

(iv) Standard deviation [4 Marks]

(v) Skewness for the data [3 Marks]

b) Prepare a Box Plot for the data. [9 Marks]

QUESTION 2

The following are marks obtained in an economics test:

92	72	92	74	96	76	98	83	79	85
88	74	50	52	58	78	58	78	61	64
88	68	53	76	67	77	64	67	90	83

a) Prepare a Stem and leaf diagram. [6 Marks]

b) Calculate the arithmetic mean. [3 marks]

c) Find the median. [2 Marks]

d) Calculate the mean deviation. [3 marks]

e) Calculate the coefficient of mean deviation. [2 Marks]

f) Calculate the standard deviation. [3 Marks]

g) Calculate the variance. [2 Marks]

h) Explain the difference between skewness and kurtosis. [4 Marks]

QUESTION 3

a) A race driver uses make A 50% of the time, make B cars 30% of the time and make C cars 20% of the time. Of the 25 races he has entered with make A cars he has won 5, of 15 races with make B cars he has won 4 and of 10 races with make C cars he has won 4.

(i) Draw a probability tree diagram. [3 Marks]

(ii) What is the probability of winning a race? [3 Marks]

(iii) P (win/ make A). [3Marks]

b) In a statistics class, the experience has been that 3 in every 10 students fail an exam. A lecturer draws a sample of 8 students from the class that wrote a statistics exam.

(i) What is the probability that 3 of these students failed the exam? [2 Marks]

(ii) What is the probability that no more than 2 of the 10 will fail? [3 Marks]

(iii) Find the probability that at least 2 out of the 10 students failed the exam. [3 Marks]

c) Suppose a number of complaints that a shop receives per day on average is 5. What is the probability that on a certain day, there are:

(i) No complaints. [2 Marks]

(ii) No more than one complaint. [3 Marks]

(iii) At least three complaints. [3 Marks]

QUESTION 4

Two fair dice are thrown and their outcomes are added together. Let X be the possible totals from the two dice.

a) Draw a probability distribution of the data. [6 Marks]

b) Using the probability distribution of the data in part (a) above, find the probability that:

(i) X lies between 4 and 9 [2 Marks]

(ii) X is greater than 8 [2 Marks]

(iii) X is at least 7 [2 Marks]

c) Calculate the expected value of X. [3 Marks]

d) Calculate the standard deviation of X. [3 Marks]

e) A box has 10 green balls and 15 black balls. Three balls are picked at random without replacement.

(i) Draw a probability tree diagram. [3 Marks]

(ii) Find the probability of at least two green balls. [4 Marks]

FORMULAE

i. Arithmetic Mean for Ungrouped Data $\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$

ii. Arithmetic Mean for Group data $\bar{x} = \frac{\sum_{i=1}^{m} f_i x_i}{n}$

iii. Harmonic Mean $= \frac{n}{\sum \frac{1}{xi}}$

iv. Geometric Mean $\sqrt[n]{x1.x2.x3.x4 \ldots\ldots xn}$

v. Mode = $L_m + \frac{C_m (f_m - f_{m-1})}{2f_m - (f_{m-1} + f_{m+1})}$

vi. median = $L_m + \frac{C_m\left(\frac{n}{2} - F_{m-1}\right)}{f_m}$

vii. Lower quartile (or first quartile, Q_1) $Q_1 = L_q + \frac{C_q\left(\frac{n}{4} - F_{q-1}\right)}{f_q}$

viii. Upper quartile (third quartile, Q_3 or 75th percentile) $Q_3 = L_q + \frac{C_q\left(\frac{3n}{4} - F_{q-1}\right)}{f_q}$

ix. Variance Ungrouped data $s^2 = \frac{1}{n-1}\sum_{1=1}^{n}(x_1 - \bar{x})^2$

x. Variance Grouped data $s^2 = \frac{1}{n-1}\sum_{i=1}^{k} f_i (x_i - \bar{x})^2$

xi. Standard Deviation $= \sqrt{S_x^2} = \sqrt{\frac{\sum_{i=1}^{k} f_i (x_i - \bar{x})2}{n-1}}$

xii. Coefficient of Variation $CV = \frac{S_x}{\bar{X}} \times 100\%$

xiii. Pearson's Coefficient of Skewness $SK_p = \frac{3\,(mean - median)}{standarddeviation}$ or $SK_p = \frac{(mean - mode)}{standarddeviation}$

xiv. Bowley's Coefficient of Skewness $SK_b = \frac{(Q_3 - Q_2) - (Q_2 - Q_1)}{(Q_3 - Q_1)}$

xv. Conditional Probability $P(A/B) = \frac{P(A \cap B)}{P(B)}$

xvi. Binomial Probability $nCrp^x\, q^{n-x}$ or $P(x) = \frac{n!}{x!(n-x)!} p^x q^{n-x}$

xvii. $E(x) = \sum x.pi$ Std Dev $\sum (x.pi)^2 - (E(x))^2$

Mean $(\mu) = np$ and Standard deviation $(\sigma) = \sqrt{npq}$

xviii. Poisson $P(x) = \frac{e^{-a} a^x}{x!}$ $P(X = x) = \frac{e^{-\lambda} \lambda^x}{x!}$,

Mean (μ) = λ and Standard deviation $(\sigma) = \sqrt{\lambda}$