

BOTSWANA COLLEGE OF OPEN AND DISTANCE LEARNING

**DIPLOMA
Human Resources Management
&
Business Management**

**Business Statistics
BS 121**

SESSIONAL EXAMINATION

Duration: 3 Hours

Marks: 100

Instructions to candidates:

1. This examination consists of three sections: A, B and C.
2. Begin each answer to a new question on a new page.
3. Answer questions according to instructions given in each section.
4. Write answers in the booklet provided.
5. Write in grammatical English.

SECTION A MULTIPLE CHOICE QUESTIONS

[20 MARKS]

Answer ALL questions. Each question carries ONE mark.

1. Which one of the following statements is **not** correct about the study of descriptive statistics?
 - A. Emphasizes on data presentation
 - B. Its aim is to summarize data into manageable size.
 - C. It concerns the methods of organizing and collecting data
 - D. It describes the probability distributions.

2. A statistic is a numerical value calculated from _____.
 - A. Population
 - B. Parameter
 - C. Sample
 - D. Mean

3. When data is collected from a portion or subset of a population of interest, we are using _____.
 - A. A parameter
 - B. A sample
 - C. A population
 - D. A statistics

4. The sum of the percent frequencies for all classes will always be equal to _____.
 - A. One
 - B. The number of classes

- C. The number of items in the study
D. 100
5. The length of a ruler in cm is an example of _____.
- A. A qualitative data
B. Categorical data
C. Continuous data
D. Discrete data
6. Which of the following is **not** used for data summarization?
- A. The range
B. The mean
C. Standard deviation
D. Bar chart
7. Which one of following statements accurately describes the mode
- A. The mode is the most frequently occurring data value
B. It can never be larger than the mean
C. Is always larger than the median
D. Is always larger than the mean
8. When data is collected from all the population. Which statement is incorrect.
- A. It is ungrouped
B. It is representative and reliable
C. It is time consuming
D. Systematic sampling can be used

9. Which one of the following is not a measure of dispersion?

- A. Variance
- B. The range
- C. Inter-quartile range
- D. The fifth percentile

Exhibit 3-1. The following data show the number of hours worked by 200 statistics students. Use it to answer question 10 – 12

<u>Number of Hours</u>	<u>Frequency</u>
0 - 9	40
10 - 19	50
20 - 29	70
30 - 39	40

10. Refer to Exhibit 3-1. The class width for this distribution _____.
- A. is 9
 - B. is 10
 - C. is 11
 - D. varies from class to class
11. Refer to Exhibit 3-1. The number of students working 29 hours or less _____.
- A. is 40
 - B. is 120
 - C. is 160
 - D. Cannot be determined without the original data

12. Refer to Exhibit 3-1. The cumulative relative frequency for the class of 10 – 19 _____.
- A. is 90
 - B. is 25
 - C. is 45
 - D. can't be determined from the information given
13. Which form of data presentation is suitable for comparisons?
- A. Pie charts
 - B. Bar graphs
 - C. Histograms
 - D. Scatter diagrams
14. The difference between the largest and the smallest data values in a set of data is referred to as _____.
- A. Variance
 - B. Inter - quartile range
 - C. Range
 - D. Coefficient of variation
15. If a data set has an even number of observations, the median _____.
- A. Cannot be determined
 - B. Is the average value of the two middle items
 - C. Must be equal to the mean
 - D. Is the average value of the two middle items when all items are arranged in ascending order.

16. In a sample of 200 students in a university, 120, or 40%, are Human Resource Management students. Based on the above information, the school's paper reported that 40% of all the students at the university are HRM students" This report is an example of _____.
- A. A sample
 - B. A population
 - C. Statistical inference
 - D. Descriptive statistics
17. A tabular summary of a set of data showing the fraction of the total number of items in several classes is a _____.
- A. Frequency distribution
 - B. Relative frequency distribution
 - C. Frequency
 - D. Cumulative frequency distribution
18. In computing descriptive statistics from grouped data, _____.
- A. Data values are treated as if they occur at the midpoint of a class
 - B. The grouped data result is more accurate than the ungrouped result
 - C. The grouped data computations are used only when a population is being analyzed
 - D. All of the above answers are correct.
19. The descriptive measure of dispersion that is based on the concept of a deviation about the mean is _____.
- A. The range
 - B. The inter - quartile range

- C. Both (a) and (b)
- D. The standard deviation

20. The correlation coefficient measures _____.

- A. The strength of the relationship between two variables.
- B. Whether or not a scatter plot shows an interesting pattern.
- C. Whether a cause and effect relation exists between two variables.
- D. The strength of a straight-line relation between two variables.

SECTION B SHORT ANSWER TYPE QUESTIONS

[40 MARKS]

Answer All Questions

Question 1

For each of the following random variables indicate the data type (i.e. discrete or continuous)

- (a) Size of shoes worn by preschool student (2marks)
- (b) Number of goods manufactured in a company (2marks)
- (c) Age during the last birthday party (2marks)
- (d) Number of customers entering a shop (2marks)
- (e) Distance travelled in km. (2marks)

Question 2

For each of the following random variables indicate the data type (ratio, interval, ordinal or nominal)

- (a) Sex or gender (2 marks)
- (b) Level of education (2 marks)
- (c) Height of tallest building in town (2 marks)
- (d) The number of pages in a textbook (2 marks)
- (e) Colours of cars (2 marks)

Question 3

The ages of workers in a mine are collected and tabulated as follows.

21	35	29	56	44	38	35	31
27	48	45	25	34	46	32	36
58	23	39	42	52	26	41	26
33	25	47	37	23	50	31	28

- Draw a frequency distribution table **(8 marks)**
- Find the modal age of workers **(2 marks)**

Question 4

The following table shows Daily temperatures of Gaborone in ($^{\circ}\text{F}$)

Daily Low temperatures	($^{\circ}\text{F}$) Frequency
35–39	1
40–44	3
45–49	5
50–54	11
55–59	7
60–64	7
65–69	1

Find the:

- Variance **(6 marks)**
- Standard deviation **(4 marks)**

SECTION C**[40 MARKS]**

Answer any two (2) questions in this section.

Question 1

The table below shows the number of men employed on a project and the total output in units

Number employed	Total Output
1	1
2	3
3	5
4	6
5	5
6	7
7	9
8	11
9	10

- i. State independent and dependent variable **(2 marks)**
- ii. Calculate Coefficient of correlation and comment on the relationship **(10 marks)**
- iii. Find the equation of the regression line **(6 marks)**
- iv. Predict the output when 12 employees are in the project **(2 marks)**

Question 2

a) Given the values on the table below

Time	Values
t_1	3
t_2	5
t_3	7
t_4	12

t ₅	8
t ₆	16
t ₇	21
t ₈	23

(a) Calculate a 3 – point moving average

(8 marks)

(b)

Drinking habits	Gender		Total
	Male	Female	
Drinks	75	85	160
Do not drink	75	65	140
	150	120	300

Find the probability

- i. Not drinking (3 marks)
- ii. Find probability that it is a female and drinks alcohol (3 marks)
- iii. Find probability that it is a male or drinks alcohol (3 marks)
- iv. Does not drink given that she is a female (3 marks)

Question 3

(20 marks)

The following data give the age of employees in an organization

Age	Frequency
-----	-----------

20 – 24	12
25 - 29	23
30 - 34	30
35 – 39	14
40 – 44	11
45 – 49	9
50 -54	1

- (a) Find the Median (10 marks)
(b) Find the Mode (10 marks)

Question 4

The retail prices of products A, B and C of a business unit in Francistown for the years 2010 and 2015 were as follows:

Product	Price per unit (BWP)		Number of units	
	2010	2015	2010	2015
A	8.50	10.00	250	280
B	7.50	12.00	500	400
C	10.00	14.00	350	420

Use 2010 as base year for the calculation of the following.

- (a). Laspeyer's Price Index and Quantity Index (8 marks)
(b). Paasche's Price index and Quantity Index. (8 marks)
(e). Fisher's Price Index and Quantity Index. (4 marks)

END OF PAPER

List of Formulae

Probability Distributions

Poisson Probability Distribution

$$P(x) = \frac{e^{-a} a^x}{x!}$$

Normal Probability Distribution

$$z = \frac{x - \mu}{\sigma}$$

Binomial Probability Distribution

$$P(x) = \frac{n! * p^x q^{n-x}}{x! * (n-x)!}$$

Simple Linear Regression Analysis

$$b = \frac{n \sum XY - \sum X \sum Y}{n \sum X^2 - (\sum X)^2}$$

$$a = \frac{\sum Y - b \sum X}{n}$$

Probability

Conditional Probability

For two events A and B, $P(A/B) = \frac{P(A \cap B)}{P(B)}$

For non-mutually exclusive events A and B

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Combinations

$${}^n C_r = \frac{n!}{r!(n-r)!}$$

Permutations

$${}^n P_r = \frac{n!}{(n-r)!}$$

Measures of Central Tendency/Dispersion

Ungrouped Data

$$\text{Samples mean } \bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\text{Sample Variance } s^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}$$

$$\text{Mean Absolute Deviation: } MAD = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{n}$$

Grouped Data

$$\text{Mean} = \bar{x} = \frac{\sum_{i=1}^n x_i}{n} = \frac{\sum_{i=1}^n x_i}{\sum_{i=1}^n f_i}$$

$$\text{Median} = O_{me} + \frac{c(\frac{n}{2} - f(<))}{f_{me}}$$

$$\text{Mode} = O_{mo} + \frac{c(f_m - f_{m-1})}{2f_m - f_{m-1} - f_{m+1}}$$

$$\text{Lower Quartile } Q_1 = O_{q1} + \frac{c(\frac{n}{4} - f(<))}{f_{q1}}$$

$$\text{Upper Quartile } Q_3 = O_{q3} + \frac{c(\frac{3n}{4} - f(<))}{f_{q3}}$$

Index Numbers

Laspeyres Price Index

$$LPI = \frac{\sum P_n Q_0}{\sum P_0 Q_0} * 100\%$$

Laspeyres Quantity Index

$$LQI = \frac{\sum P_0 Q_n}{\sum P_0 Q_0} * 100\%$$

Paasche Price Index

$$PPI = \frac{\sum P_n Q_n}{\sum P_0 Q_n} * 100\%$$

Paasche Quantity Index

$$PQI = \frac{\sum P_n Q_n}{\sum P_n Q_0} * 100\%$$

The Fishers Price Index and Fishers Quantity Index can be calculated as follows:

$$\text{Fishers Price Index} = \sqrt{LPI * PPI}$$

$$\text{Fishers Quantity Index} = \sqrt{LQI * PQI}$$