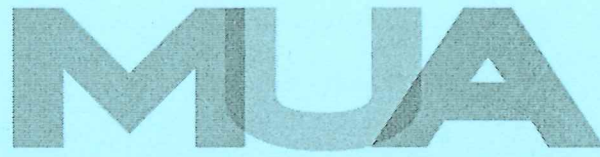


The  
Management  
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**UNDERGRADUATE UNIVERSITY EXAMINATIONS**  
**SCHOOL OF MANAGEMENT AND LEADERSHIP**  
**DEGREE OF BACHELOR OF ARTS IN DEVELOPMENT STUDIES**

**BDS 109 : STATISTICS**

**DATE: 25<sup>TH</sup> JULY 2022**

**DURATION: 2 HOURS**

**MAXIMUM MARKS: 70**

**INSTRUCTIONS:**

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. Write all your answers in the Examination answer booklet provided.

**QUESTION ONE**

- a. Define the term statistics and explain the two types of statistics. (3 marks)
- b. Explain the following terms used in statistics
- i. Population (1 mark)
  - ii. Sample (1 mark)
  - iii. Parameter (1 mark)
  - iv. Sample (1 mark)
  - v. Variable (1 mark)
- c. Differentiate between mutually exclusive event and independent event as used in probability giving examples of each. (2 marks)
- d. Distinguish between discrete and continuous variables as used in descriptive statistics. (2 marks)
- e. The following tables gives the marks of 58 students in statistics.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Number of students	4	8	11	15	12	6	2

**Required**

- i) The mean mark (3 marks)
- ii) The median mark (2 marks)
- iii) The modal mark (2 marks)
- iv) The standard deviation (4 marks)
- v) The coefficient of skewness (2 marks)

**QUESTION TWO**

A survey conducted on 600 students of Management University of Africa produced the following results.

190 of the students read Daily Nation;

180 of the students read Standard newspaper;

500 read Magazines;

130 read Daily Nation and Standard newspaper;

110 read the Standard newspaper and Magazines;



130 read Daily Nation newspaper and Magazines;

90 read all three.

Use the above information to answer the following questions

- i. Construct a Venn diagram to represent this information **(6 marks)**
- ii. How many students read none of the publication **(3 marks)**
- iii. How many read magazines only **(3 marks)**
- iv. How many read Daily Nation and the Standard newspaper, but not Magazine **(3 marks)**

### QUESTION THREE

- a. A machine comprises of 3 transformers A, B and C. The machine may operate if at least 2 transformers are working. The probability of each transformer working are given as shown below;

$$P(A) = 0.6, \quad P(B) = 0.5, \quad P(C) = 0.7$$

A mechanical engineer went to inspect the working conditions of those transformers.

Find the probabilities of having the following outcomes

- i. Only one transformer operating **(3 marks)**
  - ii. Two transformers are operating **(3 marks)**
  - iii. All three transformers are operating **(2 marks)**
- b. Calculate the rank correlation Coefficient for the following data of marks of 2 tests given to candidates for a clerical job **(7 marks)**

Preliminary Test	92	89	87	86	83	77	71	63	53	50
Final test	86	83	91	77	68	85	52	82	37	57

### QUESTION FOUR

- a) Explain coefficient of variation and coefficient of determination as used in statistics and explain their interpretation. **(4 marks)**
- b) From the distribution below, compute the Geometric mean. **(6 marks)**

Weight in Kgs	115.5	125.5	135.5	145.5	155.5	165.5
No of Students	4	10	14	53	7	12

- c) Calculate the mean absolute deviation from the mean for the following data. (5 marks)

3,000, 4,000, 4,200, 4,400, 4,600, 4,800, 5,800

### QUESTION FIVE

The following prices and quantities reflect the average weekly consumption patterns of a certain family for the years 2020 and 2021.

Item	Year 2020		Year 2021	
	Price ( $p_0$ ) Sh.	Quantity ( $q_0$ )	Price ( $p_1$ ) Sh.	Quantity ( $q_1$ )
Oranges (Kg)	15	2	25	1
Milk (Litres)	30	2	35	2
Bread (Loafs)	30	3	40	3
Eggs (Dozens)	50	1	65	1

#### Required:

- (i) Price relatives for each item. (7 marks)
- (ii) Laspeyre's price index (4 marks)
- (ii) Paasche's price index (4 marks)

### QUESTION SIX

- a. In the context of time series, explain the following terms:
- A basic trend. (1 mark)
  - Seasonal fluctuations. (1 mark)
  - Cyclical fluctuations. (1 mark)
  - Residual variations. (1mark)
- b. The following table gives the quarterly demand for the hotel accommodation, in thousands of beds.

Year	Quarter			
	1	2	3	4
2018	19.4	20.6	19.5	22.8
2019	22.3	22.6	21	24.9
2020	23.3	24.1	22.2	25.6
2021	25.1	27.3		

#### Required:

The trend and the average seasonal variation of the series. (11 marks)



FORMULAS

$$\text{Mean} = \frac{\sum X}{n}$$

$$\text{Mean,} = \frac{\sum FX}{\sum F}$$

$$\text{Z-Formula} = \frac{\text{Mean\_Value}}{\text{standard deviation}}$$

$$\text{Mode} = L + \frac{F_1}{F_1 + F_2} \times I$$

or

$$\text{Mode} = L + \left( \frac{D_1}{D_1 + D_2} \right) \cdot c$$

$$\text{Median, } X_d = L + \frac{i}{F} (m - c)$$

or

$$\text{Median} = L + \left( \frac{\frac{N}{2} - F_{m-1}}{f_m} \right) \cdot c$$

$$\text{Variance} = \frac{\sum F(X - \text{mean})^2}{\sum F}$$

or

$$\text{Variance, } S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$$

$$\text{Standard deviation} = \sqrt{\frac{\sum F(x - \text{mean})^2}{\sum F}} \quad \text{or}$$

$$\text{Standard deviation, } S = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$$

$$\text{CV} = \frac{\text{SD}}{\text{Mean}} \times 100$$

$$\text{SKp} = 3 \times \frac{(\text{mean} - \text{median})}{\text{Standard deviation}}$$

$$S = P(1 + r)^n$$

$$S = P(1 + r)^n$$

$$L_p = \frac{\sum q_0 p_n}{\sum q_0 p_0} \times 100$$

$$L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} \times 100$$

$$P_p = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100 \quad P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$$

$$F_p = \sqrt{L_p \times P_p}$$

$$F_Q = \sqrt{L_Q \times P_Q}$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \times \sqrt{n \sum y^2 - (\sum y)^2}}$$

$$R = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

Regression equation y on x,  $y = a + bx$ 

$$a = \frac{\sum y - b \sum x}{n} \quad b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

## Standard Normal Distribution Table

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998