The Management University of Africa

Sponsored by the Kenya Institute of Management

UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF ARTS IN DEVELOPMENT STUDIES

BDS 109 : STATISTICS

DATE: 7th DECEMBER 2021

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. Distinguish between the following terms as used in statistics

i. Descriptive statistics and inferential statistics **(2 marks)**

ii. Population and Sample **(2 marks)**

iii. Mutually exclusive events and independent events **(2 marks)**

iv. Secular trend and seasonal variation. **(2 marks)**

v. Regression and Correlation **(2 marks)**

b. The following data gives the aptitude test scores and productivity indices of 10 workers selected at random.

Aptitude scores (X)	60	62	65	70	72	48	53	73	65	82
Productivity index (Y)	68	60	62	80	85	40	52	62	60	81

i) Determine the regression equation of Y on X. **(7 marks)**

ii) Estimate the productivity index of a worker whose test score is 92 **(2 marks)**

c. In a competitive examination. 30 candidates are to be selected. In all 600 candidates appear in a written test, and 100 will be called for the interview.

i. What is the probability that a person will be called for the interview? **(2 marks)**

ii. Determine the probability of a person getting selected if he has been called for the interview? **(2 marks)**

iii. Probability that person is called for the interview and is selected? **(2 marks)**

QUESTION TWO

a) The daily wages of 1000 workers are normally distributed with mean wage of ksh.600 and a standard deviation of ksh.20. Estimate the number of workers whose weekly wages are:

(i) Between 590 and 640 **(3 marks)**

(ii) Less than 540 **(3 marks)**

b) The following table shows the distribution of 105 families according to their expenditure per week. Number of families corresponding to the expenditures groups

sh. (10 – 20) and sh. (30 -40) are missing from the table .The Median and Mode for the distribution are sh. 25 and sh. 24 respectively.

Expenditure (in sh)	No of families
0-10	14
10-20	?
20-30	27
30-40	?
40-50	15

Using the data calculate the missing frequencies and arithmetic mean. **(9 marks)**

QUESTION THREE

a. Explain the purpose of Venn diagrams **(6 marks)**

b. You are provided with the following information regarding the Kenyan economy for the years 2014; 2015 and 2016

Commodity	Maize (Kg)	Maize (Sh)	Rice(Kg)	Rice (Sh)	Cooking Oil (Litre)	Oil (Sh)	Onions (Kg)	Onions (Sh)
2014	50	40	85	120	150	220	90	80
2015	52	42	80	110	160	195	75	70
2016	51	45	82	115	170	230	85	65

Required:
From the above information, compute Paasches and Laspeyeres price Indices. Use year 2014 as the base year **(9 marks)**

QUESTION FOUR

a. Examine three limitations of using secondary data in statistics **(6 marks)**

b. A market researcher investigating consumers' preference for three brands of beverages namely; coffee, tea and cocoa, in Ongata town gathered the following information: From a sample of 800 consumers, 230 took coffee, 245 took tea and 325 took cocoa, 30 took all the three beverages, 70 took coffee and cocoa, 110 took coffee only, 185 took cocoa only.

Required:

(i) Present the above information in a Venn diagram. **(3 marks)**

(ii) The number of customers who took tea only. **(1 mark)**

(iii) The number of customers who took coffee and tea only. **(1 mark)**

(iv) The number of customers who took tea and cocoa only. **(2 marks)**

(v) The number of customers who took none of the beverages. **(2 marks)**

QUESTION FIVE

a. Explain three methods of fitting a trend in time series analysis. **(6 marks)**

b. The quarterly sales data for Chuka hardware are given below:

Year	Quarter			
	1	2	3	4
	(Sh. million)	(Sh. million)	(Sh. million)	(Sh. million)
2013	8.5	10.4	7.5	11.8
2014	9.5	12.2	8.8	13.6
2015	10.4	13.5	9.7	13.1
2016	9.5	11.7	8.4	12.9
2017	10.9	13.7	10.1	15.0

Required:

(i) The centered four-quarter moving averages. **(6 marks)**

(ii) The specific seasonal variation for each quarter. **(3 marks)**

QUESTION SIX

a. A sample of 40 electric batteries gives a mean life span of 600 hours with a standard deviation of 20 hours. Another sample of 50 electric batteries gives a mean lifespan of 520 hours with a standard deviation of 30 hours. If these two samples were combined and used in a given project simultaneously, determine the combined new mean for the larger sample and hence determine the combined standard deviation. **(9 marks)**

b. In a given farm located in the UK the average salary of the employees is £ 3500 with a standard deviation of £150. The same firm has a local branch in Kenya in which the average salaries are Kshs 8500 with a standard deviation of Kshs.800. Determine the coefficient of variation in the 2 firms and briefly comment on the degree of dispersion of the salaries in the 2 firms. **(6 marks)**

FORMULAS

$$\text{Mean} = \frac{\sum X}{n} \qquad \text{Mean}, = \frac{\Sigma FX}{\Sigma F} \qquad \text{Z-Formula} = \frac{\text{Mean\_Value}}{\text{standard deviation}}$$

$$\text{Mode} = L + \frac{F1}{F1+F2} \times I \quad \text{or} \quad \text{Mode} = L + \left(\frac{D_1}{D_1+D_2}\right).c$$

$$\text{Median}, X_d = L + \frac{i}{F}(m - c) \quad \text{or} \quad \text{Median} = L + \left(\frac{\frac{N}{2} - F_{m-1}}{f_m}\right).c$$

$$\text{Variance} = \frac{\Sigma F(X - \text{mean})^2}{\Sigma F} \quad \text{or} \quad \text{Variance}, S^2 = \frac{\sum fx^2}{\sum f} - \bar{x}^2$$

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

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

$$CV = \frac{SD}{\text{Mean}} \times 100 \qquad SKp = 3 \times \frac{(\text{mean} - \text{median})}{\text{Standard deviation}}$$

$$S = P(1 + r\,n) \qquad S = P(1 + r)^n$$

$$L_P = \frac{\sum q_0 p_n}{\sum q_0 p_0} \times 100 \qquad L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} \times 100 \qquad P_P = \frac{\sum q_n p_n}{\sum q_n p_0} \times 100 \qquad P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} \times 100$$

$$F_P = \sqrt{L_P \times P_P} \qquad F_Q = \sqrt{L_Q \times P_Q}$$

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

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

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

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

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

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