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 FOR DEVELOPMENT

DATE: 29TH JULY 2024

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) The life times of electric components manufactured by JJ distributors are normally distributed with mean of 2500 hours and standard deviation of 600 hours. If the daily production is 500 components, how many are expected to have a life time of:

i) Between 2350 hours and 2580 hours **(3 Marks)**

ii) More than 2380 hours **(3 Marks)**

b) Given the following data: 34, 25, 30, 19, 26, 31, Calculate the coefficient of the variation of the distribution **(4 Marks)**

c) Explain the four functions of statistics in the field of development studies **(2 Marks)**

d) Explain four reasons why researchers use a sample data instead of population data **(2 Marks)**

e) Consider the following distribution of the marks obtained in two tests (preliminary and final test) by eight candidates interviewed to inform the project manager on who to be given priority in being considered as a project team

Preliminary test	44	35	30	36	41	29	32
Final test	40	42	38	35	37	41	33

Required: Calculate the Rank Coefficient of Correlation and comment on the answer **(4 Marks)**

f) Why is Fisher's index commonly referred to as 'ideal'? **(2 Marks)**

g) Let: $\mathcal{E}$ = Letters in the word GENE'RAL

A = Letters in the word ANGEL

B = Letters in the word LEAN

Use the diagram or otherwise to list the sets:

i) A^c **(1 Marks)**

ii) $(A \cap B)^c$ **(2 Marks)**

iii) $n(A) + n(B)^c$ **(2 Marks)**

QUESTION TWO

The statistics obtained from one of the private colleges, indicated that the age of the students who are taking Diploma courses are between 15 years and 44 years. The following table shows the age distribution

AGE (YEARS)	NO. OF STUDENTS (F)
15 - 19	21
20 - 24	35
25 - 29	38
30 - 34	49
35 - 39	31
40 - 44	19

Required: Calculate

a) The mean age of the students **(4 Marks)**

b) The standard deviation **(9 Marks)**

c) The coefficient of variance **(2 Marks)**

QUESTION THREE

The car distributor owner has recorded the number of sales men employed in each of their ten branches across Nairobi County to market the cars and their corresponding number of cars sold per year. The table below shows the data.

Branches	A	B	C	D	E	F	G	H	I	J
No of salesmen (X)	12	8	6	10	9	7	9	10	11	6
No of cars sold (Y)	112	120	118	126	138	100	132	108	122	129

Required:

a) Determine the regression equation of the number of cars sold on the number of salesmen. **(9 Marks)**

b) Predict the number of cars likely to be sold by engaging 15 salesmen in any of the branch **(2 Marks)**

c) Determine the coefficient of correlation between the two variables **(4 Marks)**

QUESTION FOUR

a) Using a well labeled diagram, explain two types of skewness **(6 Marks)**

b) Explain the two methods used in constructing a simple index number **(3 Marks)**

c) There are five flights daily from Moi International airport to Jomo Kenyatta International airport. Suppose the probability that any flight arrives late is 0.2. What is the probability that: -

i. None of the flights are late today? **(3 Marks)**

ii. Exactly one of the flights is late today? **(3 Marks)**

QUESTION FIVE

a) Using examples in each case, explain the following terminologies as used in statistics **(5 Marks)**

i. Class interval

ii. Score limits

iii. Class size

iv. Real limits

v. Mid points

b) In order to determine their performance in the year 2023, Najma provided you as an expert with the following data which relate to the price and quantity of three types of clothes (A,B,C), they have sale. The following table shows the distribution over the two years:

Commodity	2022		2023	
	Price	Quantity	Price	Quantity
A	2,500	12	1,800	10
B	3,000	11	2,700	15
C	2,000	15	3,500	16

Comment on the performance using the Fisher's 'ideal' price index **(10 Marks)**

QUESTION SIX

a) Explain three characteristics of time series decomposition **(6 Marks)**

b) Out of a group of 60 people, 20 invested in the stock market, 35 had Certificate of Deposit (CD's) and 34 had savings bonds. Furthermore 23 had both CD's and bonds, 13 had both CD's and stocks and 13 had both stocks and bonds. Finally, 10 of the people had no investments. Determine how many of the 60 people had all the three type of investments **(9 Marks)**

FORMULAS

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

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

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

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

$S = \sqrt{\frac{\Sigma F(x - mean)^2}{\Sigma F}}$ or $S \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

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

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

$$\bar{X}_{12} = \frac{N_1\bar{X}_1 + N_2\bar{X}_2}{N_1 + N_2}$$

$$\delta_{12} = \sqrt{\frac{N_1\delta_1^2 + N_2\delta_2^2 + N_1d_1^2 + N_2d_2^2}{N_1 + N_2}}$$

$$\mu = x_1p(x_1) + x_2p(x_2) + \ldots x_np(x_n) = \sum_{i=1}^{n} x_ip(x_i)$$

$$Var(X) = \sum_{i=1}^{n}(x_i - \mu)^2 . p(x_i)$$

$$SSW = \sum_{j=1}^{k}\sum_{i=1}^{n_j} X_{ij}^2 - \sum_{j=1}^{k}\frac{T_j^2}{n_j}$$

$$r = \frac{n\sum XY - \sum X\sum Y}{\sqrt{\left[n\sum X^2 - \left(\sum X\right)^2\right]\left[n\sum Y^2 - \left(\sum Y\right)^2\right]}}$$

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

$$r\sqrt{\frac{n-2}{1-r^2}}.$$

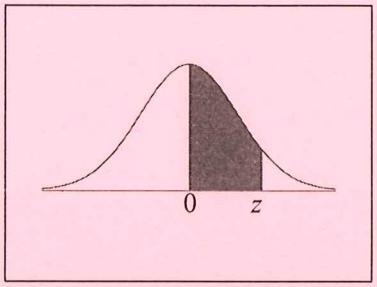
$$\hat{b} = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - \left(\sum X\right)^2} \qquad \hat{a} = \frac{1}{n}\left(\sum Y - \hat{b}\sum X\right) \quad = \quad \overline{Y} - \hat{b}\overline{X}$$

$$L_P = \frac{\sum q_0 p_n}{\sum q_0 p_0} x100 \qquad L_Q = \frac{\sum p_0 q_n}{\sum p_0 q_0} x100 \qquad P_P = \frac{\sum q_n p_n}{\sum q_n p_0} x100 \; P_Q = \frac{\sum p_n q_n}{\sum p_n q_0} x100$$

$$F_P = \sqrt{L_P x P_P} \qquad F_Q = \sqrt{L_Q x P_Q} \quad p(n,x) = \binom{n}{x} p^x q^{n-x} \qquad \mu \quad = \quad np$$

$$\delta^2 = npq$$

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

Gilles Cazelais. Typeset with LaTeX on April 20, 2006.