2902/204 2908/204
2909/204 2920/204
QUANTITATIVE METHODS
November 2022
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN SALES AND MARKETING
DIPLOMA IN ROAD TRANSPORT MANAGEMENT
DIPLOMA IN HUMAN RESOURCE MANAGEMENT
DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

MODULE II

QUANTITATIVE METHODS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have a scientific calculator for this examination.
This paper consists of SEVEN questions.
*Answer any **FIVE** questions in the answer booklet provided.*
Candidates should answer the questions in English.

This paper consists of 7 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

1. (a) Explain **five** sources of secondary data. (10 marks)

(b) A study on the number of years of education among workers in an organization revealed the following:

Years of education	Number of workers
0 - 2	3
2 - 4	4
4 - 6	4
6 - 8	6
8 - 10	2
10 - 12	1

Determine the:

(i) standard deviation;
(ii) variance;
(iii) coefficient of variation.

(10 marks)

2. (a) The following information relates to Tepe Limited for the year 2020.

	Number of Employees		
Department	**Grade A**	**Grade B**	**Grade C**
Finance	20	10	6
Marketing	16	8	6
Production	14	8	4

Present the information above, in a component bar chart. (12 marks)

(b) The reception of an office has two computers; A and B. The probability of computer A failing is 0.15 and the probability of computer B failing is 0.25. Determine the probability that:

(i) both computers are working;

(ii) both computers are not working;

(iii) only one computer is working;

(iv) at least one computer is working.

(8 marks)

3. (a) Explain five advantages of using simple random sampling in the collection of data.

(10 marks)

(b) The following data relates to the monthly income and electricity consumption by ten families randomly selected from an urban centre.

Monthly Income (Ksh. 000's)	Monthly Electricity Consumption (kWh)
14	680
23	1050
9	400
17	790
10	810
22	950
5	310
12	720
6	450
16	930

(i) Determine Pearson's correlation coefficient between the monthly income and monthly electricity consumption.

(ii) Interpret the result in (i) above. (10 marks)

4. (a) Explain the meaning of each of the following terms as used in probability theory:

(i) mutually exclusive events;

(ii) independent events;

(iii) collectively exhaustive events;

(iv) complimentary events.

(8 marks)

(b) The following data shows the profits made by a company for a period of 10 years.

Year	Sales (Ksh. millions)
2005	40
2006	55
2007	60
2008	60
2009	70
2010	75
2011	90
2012	110
2013	105
2014	130
2020	300

(i) Using the method of semi-averages, determine the trendline equation.

(ii) Using the result in (i) above, determine the profit the company will make in the year 2015.

(12 marks)

5. (a) Explain **five** factors that may be considered in determining the sample size during data collection. (10 marks)

(b) Cheche Limited intends to invest Ksh. 2,500,000 in either project X or project Y. The following is the expected net cash inflows from the projects.

Year	Expected Net Cash Inflows	
	Project X (Ksh.)	Project Y (Ksh.)
1	800,000	600,000
2	400,000	1,200,000
3	600,000	800,000
4	1,400,000	200,000
5	100,000	-
6	400,000	-

(i) Determine the payment period of each project.

(ii) Based on the results in (i) above, advise the management on the project to invest in.

(10 marks)

6. (a) The following is the distribution of marks scored by students in a test.

Marks	Number of students
0	46
1	x
2	y
3	25
4	10
5	5
	200

The arithmetic mean of the distribution is 1.46.

Determine the:

(i) values of x and y;

(ii) mode;

(iii) median.

(11 marks)

(b) The time it takes an international telephone operator to place an overseas phone call is normally distributed with a mean of 45 seconds and a standard deviation of 10 seconds.

Determine the probability that:

(i) a call will go through in less than one minute;

(ii) a call will go through in less than 40 seconds;

(iii) a caller will have to wait for more than 40 seconds for his call to go through.

(9 marks)

7. (a) Distingish between each of the following terms as used in financial Mathematics.

(i) perpetuity and annuity;

(ii) discounting and compounding.

(8 marks)

(b) The following information shows the marks scored by eight job applicants in communication and statistics examinations.

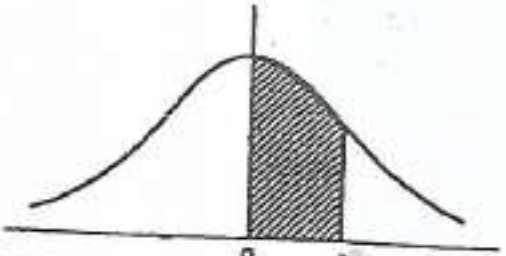
Job Applicant	:	A	B	C	D	E	F	G	H
Communication x	:	15	24	28	12	40	60	20	80
Statistics y	:	40	35	50	30	20	10	32	60

(i) Determine Spearman's rank coefficient of correlation.

(ii) Interpret the results in (i) above.

(12 marks)

Partial areas under the standardised normal curve



$z = \frac{x-\bar{x}}{\sigma}$	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0.0040	0.0080	0.0120	0.0159	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0678	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1388	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1891	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2086	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2760	0.2794	0.2893	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3215	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3451	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4430	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4762	0.4767
2.0	0.4772	0.4778	0.4783	0.4785	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4882	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4980	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

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