

2405/304
APPLIED STATISTICS
Oct./Nov. 2016
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN APPLIED STATISTICS

APPLIED STATISTICS

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

Answer booklet;

Mathematical tables/Scientific calculator.

This paper consists of EIGHT questions.

Answer any FIVE questions.

ALL questions carry equal marks.

Maximum marks for each part of a question are indicated.

Candidates should answer all questions in English.

Table of Normal distribution is attached.

This paper consists of 6 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 any **three** uses of time series analysis. (6 marks)
- (b) Table 1 shows the production of a certain commodity in thousands for different years.

Table 1

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Production in '000'	360	370	380	402	420	390	386	470	500

- (i) Calculate the three year moving averages for the data.
- (ii) Plot a time series graph for the data indicating the trend line. (14 marks)

2. (a) Explain the following terms: (8 marks)
- Sampling frame
 - Quota sampling
 - Qualitative data
 - Questionnaire

- (b) Table 2 shows the expenditure of a certain family during the years 2010 and 2011

Table 2

Item	2010		2011	
	Prices (Shs)	Quantity (kg)	Price (Shs)	Quantity (kg)
Rice	30	1000	34	1400
Sugar	58	240	72	280
Potatoes	78	160	82	200
Bread	62	80	78	60
Beans	72	100	90	80

Calculate the:

$$\frac{P_1 Q_0}{P_0 Q_0} \quad \frac{Q_1 P_0}{P_0 Q_0} \quad \frac{P_1 Q_1}{P_0 Q_1} \quad \frac{Q_1 P_1}{Q_0 P_1}$$

- Laspeyres price index
 - Paasche's price index
 - Fisher's ideal price index
 - Marshall-Edgeworth price index
- (12 marks)

300
314
400.67
404
318.67
415.33
452

3. (a) State the importance of a Lorenz curve. (2 marks)
- (b) List any **three** limitations of using a pie-chart to present data. (3 marks)
- (c) The following data shows the values of imports and exports of a certain country for a three year period.

Year	Quarter	Exports	Imports
		Shs 'billion'	Shs 'billion'
2003	1	1.9	7.8
	2	1.8	5.8
	3	1.6	7.2
	4	1.3	5.2
2004	1	1.5	4.6
	2	1.3	3.0
	3	1.5	3.6
	4	1.4	3.2
2005	1	1.6	2.4
	2	1.7	2.2
	3	1.2	2.5
	4	1.3	3.6

- (i) Construct Lorenz curve for the above data.
- (ii) Comment on the shape of the graph obtained in c(i). (15 marks)

4. (a) Explain five advantages of quality control to an industry. (10 marks)

- (b) Ten castings were inspected for defects. The following data indicates the number of defects found on the castings:

1 2 3 4 5 6 7 8 9 10
2, 4, 1, 5, 8, 6, 3, 0, 4, 7.

- (i) Draw a C-chart for the number of defectives.
- (ii) Comment on whether the process is under control or not. (10 marks)

$$\begin{aligned}
 \bar{c} &= 5 \\
 UCL &= 3 + \sqrt{c} \\
 LCL &= 3 - \sqrt{c}
 \end{aligned}$$

5. (a) State any **six** benefits of using sampling during inspection. (6 marks)
- (b) Table 3 shows the scores obtained by salesmen in a marketing campaign for two different companies X and Y.

Table 3

Scores	Number of salesmen	
	Company X	Company Y
10 - 20	12	40
20 - 30	10	20
30 - 40	18	24
40 - 50	28	30
50 - 60	26	10
60 - 70	30	10

Determine the following and hence explain the company favoured by the campaign:

- (i) arithmetic mean
- (ii) standard deviation
- (iii) coefficient of variation

(14 marks)

6. (a) Explain:
- (i) the **three** approaches used in computation of national income statistics.
 - (ii) any **five** difficulties encountered when measuring national income.
- (16 marks)
- (b) State any **four** benefits of a decentralised statistical system. (4 marks)
7. (a) State **three** advantages and **three** disadvantages of using secondary data. (6 marks)

- (b) Table 4 shows the incomes earned by some employees in a certain company.

Table 4

Incomes in Shs '000	Number of employees
0 - 10	18
10 - 20	26
20 - 30	60
30 - 40	100
40 - 50	42
50 - 60	31
60 - 70	19
70 - 80	10
80 - 90	6

- (i) Draw a histogram for the frequency distribution.
- (ii) Estimate the modal monthly income from the histogram.
- (iii) State any **three** limitations of mode.

(14 marks)

8. (a) (i) Distinguish between Terms of Trade and Balance of Trade.

(ii) Explain any **four** causes of unfavourable terms of trade as realised by developing countries.

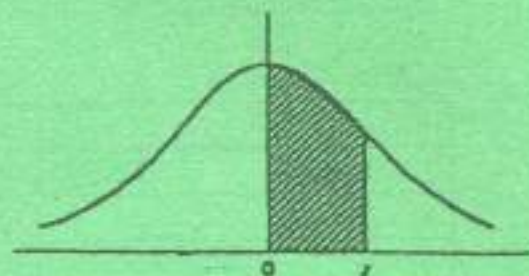
(iii) State any **two** limitations of under population in a country.

(12 marks)

- (b) A machine fills packets with tea leaves which are supposed to have a mean weight of 40 grams. A random sample of 36 packets is taken and a mean weight is found to be 42.4 grams with a standard deviation of 6 grams. Test at 5% level of significance whether the sample comes from a population with mean weight of 40 grams.

(8 marks)

Partial areas under the
standardised normal curve



$z = \frac{x - \mu}{\sigma}$	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	0.2823	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	0.3313	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	0.4887	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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