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Exam

2405/304  
APPLIED STATISTICS  
Oct./Nov. 2018  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL  
DIPLOMA IN APPLIED STATISTICS

APPLIED STATISTICS

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:

*Answer booklet;*

*Mathematical tables;*

*Non programmable scientific calculator.*

*Table of Normal distribution is attached.*

*This paper consists of EIGHT questions.*

*Answer any FIVE questions in the answer booklet provided.*

*All questions carry equal marks.*

*Maximum marks for each part of a question are indicated.*

*All working MUST be clearly shown.*

*Candidates should answer the questions in English.*

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 **four** sampling techniques used in data collection. (8 marks)

(b) The following data shows the net output of a certain manufacturing industry.

Number of firms	Net output (in millions)
210	16
208	60
36	18
30	28
20	29
10	58



- (i) construct the Lorenz Curve;
- (ii) comment on the level of distribution in the output. (12 marks)

2. (a) Highlight **four** difficulties encountered in the computation of index numbers. (8 marks)

(b) Table 1 shows the prices and quantities of different commodities in a certain region from the year 2012 and 2013.

Table 1

COMMODITY	2012		2013	
	Quantity	Price (shs)	Quantity	Price (shs)
A	12	160	14	200
B	8	240	12	280
C	16	80	18	100
D	10	100	14	140
E	14	60	16	90
F	13	40	90	180

Calculate:

- (i) Laspeyre's quantity index;  $\frac{Q_1 P_0}{Q_0 P_0} \times 100$
  - (ii) Paasche's quantity index;  $\frac{Q_1 P_1}{Q_0 P_1} \times 100$
  - (iii) Fisher's ideal quantity index.  $\sqrt{\frac{Q_1 P_0}{Q_0 P_0} \times \frac{Q_1 P_1}{Q_0 P_1}}$  (11 marks)
- (c) Comment on the results obtained in b(iii). (1 mark)



3. (a) With reference to acceptance sampling, distinguish between each of the following pairs of terms:
- lot tolerance and acceptance quality level;
  - producer's risk and consumer's risk.
- (8 marks)

- (b) The following data indicates the number of items inspected and the defectives found.

Sample Number	Number of Items Inspected	Number of Defectives found
1	200	3
2	210	4
3	215	2
4	214	1
5	210	3
6	211	2
7	208	1
8	202	6
9	204	2
10	206	3
11	220	9
12	240	7



- Construct the fractional defective chart.
  - Comment whether the production process is under control or not. (12 marks)
4. (a) Explain **four** precautions that should be taken when drafting a questionnaire. (8 marks)
- (b) An investor intends to invest in either stock P or Q listed on the securities exchange of a certain country. The data in table 2 relates to the price behaviour of the two stocks for the past 100 days.



Table 2

Price (Shs)	Number of days	
	Stock P	Stock Q
50-60	9	8
60-70	15	6
70-80	28	18
80-90	34	14
90-100	6	32
100-110	6	12
110-120	2	10



Determine the:

- (i) arithmetic mean;  $\frac{\sum fx}{n}$
- (ii) standard deviation;  $\sqrt{\frac{\sum f(x-\bar{x})^2}{n}}$
- (iii) coefficient of variation.

Handwritten calculations:  
 $\sum fx = 30810$   
 $\sum f(x-\bar{x})^2 = 640500$   
 $\bar{x} = 7790$

- (b) [redacted] (11 marks)
- (c) Using the results obtained in (b), advise the investor on which stock to invest in. (1 mark)

- 5. (a) Explain four components of time series. (8 marks)
- (b) Table 3 shows the production in thousands of tonnes of commodity Y by a company for a period of eight years.

Table 3

Year	1990	1991	1992	1993	1994	1995	1996	1997
Production '000'	36	48	57	60	66	68	72	82

- (i) Using the method of least squares, determine the trend equation.
- (ii) Estimate the production volume for the year 2000. (12 marks)

- 6. (a) Explain five benefits a country may derive from participating in international trade. (10 marks)
- (b) Table 4 shows the weekly rent of 320 houses.





Table 4

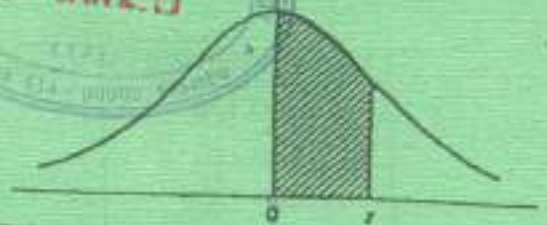
Weekly rent (K £)	Number of houses
100-120	8
120-140	18
140-160	62
160-180	96
180-200	42
200-220	28
220-240	16
240-260	26
260-280	14
280-300	10

$(\frac{10+40f}{2})^2$   
 $\frac{199.5 + 210 + 226}{2}$   
 $\frac{199.5}{2}$   
 $\frac{210}{2}$   
 $\frac{226}{2}$   
 $63.45$

- (i) Draw an ogive for the frequency distribution;
  - (ii) Estimate the median rent from the ogive. (10 marks)
7. (a) Distinguish between Gross Domestic Product and Gross National Product. (4 marks)
- (b) Outline five: (10 marks)
- (i) importance of national income statistics;
  - (ii) disadvantages of free international trade.
- (c) State three: (6 marks)
- (i) causes of income inequality;
  - (ii) effects of income inequality.
8. (a) Outline six benefits of statistical quality control. (6 marks)
- (b) A sample of 1000 fluorescent light tubes from the Short Life Tube company has a mean life of 20.5 hours and a standard deviation of 1.6 hours. Test, at 1% level, whether the sample comes from a population with mean of 23.2 hours. (9 marks)
- (c) Outline five benefits of over-population to a country. (5 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	0.1368	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	0.2088	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	0.2764	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	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438				0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665				0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869				0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049				0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207				0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345				0.4394	0.4406	0.4418	0.4430	0.4441
1.6	0.4452	0.4463				0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564				0.4579	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	0.4988	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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