



**NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY**

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of science ; Bachelor of science in Applied Mathematics and Statistics	
QUALIFICATION CODE: 07BOSC	LEVEL: 5
COURSE CODE: IAS501S	COURSE NAME: INTRODUCTION TO APPLIED STATISTICS
SESSION: JULY 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Mr ROUX, A.J
MODERATOR:	Dr Ntirampeba, D

INSTRUCTIONS
<ol style="list-style-type: none">1. Answer ALL the questions in the booklet provided.2. Show clearly all the steps used in the calculations.3. All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS

Non-programmable calculator without a cover.

ATTACHMENTS

The Standard Normal Probability Distribution Table

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Including this front page)

QUESTION 1 [14]

1.1 Briefly distinguish between discrete and continuous data. Give one example for each data set. (6)

1.2 Indicate whether each of the following variables is quantitative or qualitative, and identify the appropriate scale of measurement:

1.2.1 age of a respondent to a consumer survey (2)

1.2.2 gender of a respondent to a consumer survey (2)

1.2.3 class rank of people taking an exam (2)

1.2.4 make of a motorcar owned by a sample of 50 drivers (2)

QUESTION 2 [17]

The Statistics Department at NUST randomly selected 22 students and recorded their cholesterol values after the long holiday. The results are as follows:

210, 221, 217, 221, 213, 217, 218, 207, 210, 214, 210

199, 209, 202, 208, 212, 200, 210, 215, 203, 218, 208

Use the data provided to calculate the following measures:

2.1 Mean (3)

2.2 Median (3)

2.3 Mode (1)

2.4 Variance (5)

2.5 Standard deviation (2)

2.6 Coefficient of Variation (3)

QUESTION 3 [15]

- 3.1 State the properties of the normal distribution function. (4)
- 3.2 The time cyclists take to complete a race is approximately normally distributed with a mean time of 70 minutes and a standard deviation of 8 minutes. What proportion of cyclist will take:
- 3.2.1 At least 76 minutes? (5)
- 3.2.2 Between 64 minutes and 76 minutes, both inclusive? (6)

QUESTION 4 [30]

- 4.1 The number of fatalities that occur in a large metropolitan city is described by a mean of 1.8 per day. Find the probabilities of the following events.
- 4.1.1 Three or more fatalities in a day. (8)
- 4.1.2 Between 10 and 12 (both inclusive) fatalities during a 5 day period. (7)
- 4.2 A discrete random variable can be described by the Binomial distribution if it satisfies four conditions. State any three of these conditions. (3)
- 4.3 A marketing survey shows that approximately 80% of students indicate that they have smart phones, determine the probability that:
- 4.3.1) in a random sample of five students, all 5 indicate that they have smart phones. (5)
- 4.3.2) in this random sample of five students, at most one indicates that he or she has a smart phone. (7)

QUESTION 5 [24]

5.1) During a recent graduation season a total of 8000 students graduated from three different universities A, B and C. Of the 8000 graduates, 4000 students graduated from University A, 3000 students graduated from University B, while the rest of the students graduated from University C. A total of 85 out of 100 students from University A graduated from their Business School. At University B, 65 out of 100 students graduated from their Business School, and at University C, 60 out of 100 students graduated from their Business School. The Minister of Education randomly selects a graduate and finds the graduate to be from a Business School.

5.1.1) Using a tree diagram calculate the probability that the selected graduate is from a Business School. (7)

5.1.2) Calculate the probability that the graduate is from University B. (3)

5.2) A company's sales for the years 2010 to 2018 were as follows: (x N\$ 10 000)

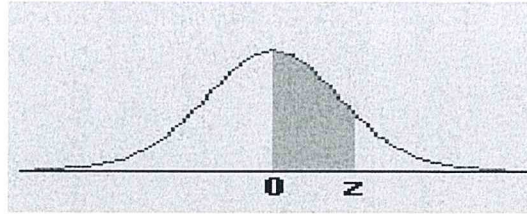
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018
Sales	324	296	310	305	295	347	348	364	370

5.1.1) Derive, by using the method of least squares, an equation of linear trend for the sales of the company. (Use sequential numbering with $x = 1$ in 2010) (8)

5.1.2) Compute trend values for the years 2008 and 2021 (6)

Xxxxxxxxxxxxxxxxxxxxxx END OF EXAMINATION xxxxxxxxxxxxxxxxxxxxxxxx

APPENDIX A: The Standard Normal Distribution



z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	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	0.0675	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	0.1591	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	0.3461	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	0.4429	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	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	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	0.4979	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