



**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: NOVEMBER 2019	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
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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 [15]

A class teacher summarized the grades obtained for learners in the recent examination into the following categories *A*, *B*, *C*, *D* and *E* respectively.

The following table shows data that were collected from a sample of 50 learners.

<i>A</i>	<i>C</i>	<i>E</i>	<i>B</i>	<i>D</i>	<i>C</i>	<i>D</i>	<i>B</i>	<i>D</i>	<i>C</i>
<i>D</i>	<i>B</i>	<i>D</i>	<i>E</i>	<i>C</i>	<i>A</i>	<i>D</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>D</i>	<i>C</i>	<i>A</i>	<i>B</i>	<i>D</i>	<i>C</i>	<i>B</i>	<i>E</i>	<i>C</i>	<i>D</i>
<i>B</i>	<i>C</i>	<i>D</i>	<i>C</i>	<i>D</i>	<i>C</i>	<i>E</i>	<i>A</i>	<i>D</i>	<i>C</i>
<i>C</i>	<i>B</i>	<i>D</i>	<i>D</i>	<i>B</i>	<i>D</i>	<i>C</i>	<i>E</i>	<i>B</i>	<i>A</i>

- 1.1) Construct the frequency distribution for the data set. (8)
- 1.2) Construct the relative frequency distribution for the data set (2).
- 1.3) Construct the bar charts for the absolute frequency distribution for the data set. (5)

QUESTION 2 [35]

- 2.1 Indicate whether each of the following variables is quantitative or qualitative, and identify the appropriate scale of measurement:
 - 2.1.1) age of a respondent to a consumer survey (2)
 - 2.1.2) gender of a respondent to a consumer survey (2)
 - 2.1.3) class rank of people taking an exam (2)
 - 2.1.4) make of a motorcar owned by a sample of 50 drivers (2)
 - 2.1.5) the number of participants entered for a race (2)

- 2.2) For each of the following random variables, indicate if the data type is discrete or continuous
 - 2.2.1) The weight of a new born baby (1)
 - 2.2.2) The number of stones in a basket (1)
 - 2.2.3) The distance I walk to campus. (1)
 - 2.2.4) The number of assignments submitted by mail (1)
 - 2.2.5) The height on a building (1)

2.3) Students are always encouraged to study as much as possible in preparation for an examination. The data below shows the number of hours of studying for a sample of twenty students in preparation for a statistics examination.

13 14 9 17 21 10 15 22 19 13
 22 13 19 23 17 21 10 9 20 18

For the data set provided above, calculate and interpret the:

- 2.3.1) Range (2)
- 2.3.2) Mode (2)
- 2.3.3) Median (3)
- 2.3.4) Arithmetic mean (3)
- 2.3.5) Variance (6)
- 2.3.6) Standard deviation (2)
- 2.3.7) Coefficient of variation (2)

QUESTION 3 [35]

3.1 A statistics professor believes that there is a relationship between the number of missed classes and the grade on his mid-semester test. After examining his records he produced the following table of joint probabilities.

	Student fails the test	Student passes the test
Student misses fewer than 5 classes	0.02	0.86
Student misses 5 or more classes	0.09	0.03

- 3.1.1) What is the pass rate on the tests? (3)
- 3.1.2) What proportion of students who miss 5 or more classes passes the test? (3)
- 3.1.3) What proportion of students who miss fewer than 5 classes passes the test? (3)
- 3.1.4) What is the probability that a student will pass the test, provided that the student missed fewer than 5 classes? (4)
- 3.1.5) Are the events failing the test and missing 5 or more classes independent? (2)

3.2) A student represents his school in three sports codes, Baseball, Soccer and Hockey. This student spends 50% of the practice time on baseball, 30% of the time on soccer and the rest of his practice time on hockey. Despite all the practice time the student spent on his various sports codes, there is a two percent chance of scoring a goal in baseball, and also a 2% chance of scoring a goal in soccer, while there is a three percent chance of scoring a goal in hockey.

3.2.1) Determine the probability that the student will score a goal in any one of his sports codes. (7)

3.2.2) If the student scored a goal in one of his sports codes, determine the probability that the student scored the goal in baseball? (3)

3.3.) A company which supplies computers to the commercial industries receives on average 6 orders per hour. What is the probability that:

3.3.1) No orders will be received within the next 15 minutes (4)

3.3.2) At least one order will be received during the next 2 hours. (6)

QUESTION 4 [15]

The asset turnovers, excluding cash and short-term investments, for the Blue Waters Fishing Company from 2008 to 2017 are listed below (in \$mil):

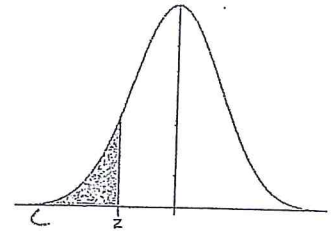
YEAR	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
TURNOVERS	3.0	4.2	4.8	3.7	3.4	4.3	5.6	4.4	3.8	4.1

4.1 Determine the least squares trend line equation, using the sequential coding method with X=1 in 2008. (9)

4.2 Use the trend line equation to estimate turnovers for 2006 and 2020 (2 x 3 = 6)

Xxxxxxxxxxxxxxxxxxxxxx END OF EXAMINATION xxxxxxxxxxxxxxxxxxxxxxxx

Standard Normal Cumulative Probability Table



Cumulative probabilities for NEGATIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641