Faculty of Health and Applied Sciences

Department of Mathematics and Statistics

QUALIFICATIONS: B. Business Admin, B. Marketing, B. Human Resource Management, B. Public Management and B. Logistics and Supply Chain Management	
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COURSE: BASIC BUSINESS STATISTICS 1A	COURSE CODE: BBS111S
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DURATION: 3 HOURS	MARKS: 100

SECOND OPPORTUNITY/SUPPLEMENTARY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR EM MWAHI, DR G DIBABA, MR I NDADI, MR J AMUNYELA, MR R MUMBUU, MR A ROUX, MR G TAPEDZESA
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THIS QUESTION PAPER CONSISTS OF 6 PAGES

(Including this front page)

INSTRUCTIONS

1. Answer all the questions and number your solutions correctly.
2. **Question 1** of this question paper entails multiple choice questions with options **A** to **D**. Write down the letter corresponding to the best option for each question.
3. For **Question 2 - 6** you are required to show clearly all the steps used in the calculations.
4. All written work MUST be done in blue or black ink.
5. Untidy/ illegible work will attract no marks.

PERMISSIBLE MATERIALS

Non-Programmable Calculator without the cover

ATTACHMENTS

Standard normal Z-table

SECTION A

QUESTION 1 [20 MARKS]

Write down the letter corresponding to your choice next to the question number

1.1 In a grouped frequency distribution the class intervals should be mutually exclusive. This means that they should be: [2]

   A. Of the same length
   B. Open-ended
   B. Not overlapping
   C. Not open-ended
   D. None of the above

1.2. Which of the following methods are used in presenting categorical (qualitative) data.

   A. Bar charts, pie charts and Histogram [2]
   B. Bar charts, pie charts and frequency tables
   C. Mean, median and mode
   D. Variance, standard deviation and coefficient of variation
   E. None of the above

1.3. A random sample of 240 students from the Department of Statistics at NUST is selected. The bar chart below shows the most popular soft drinks bought at the Cafeteria by the Statistics students in a week.

Popular Soft Drinks at NUST Statistics Department
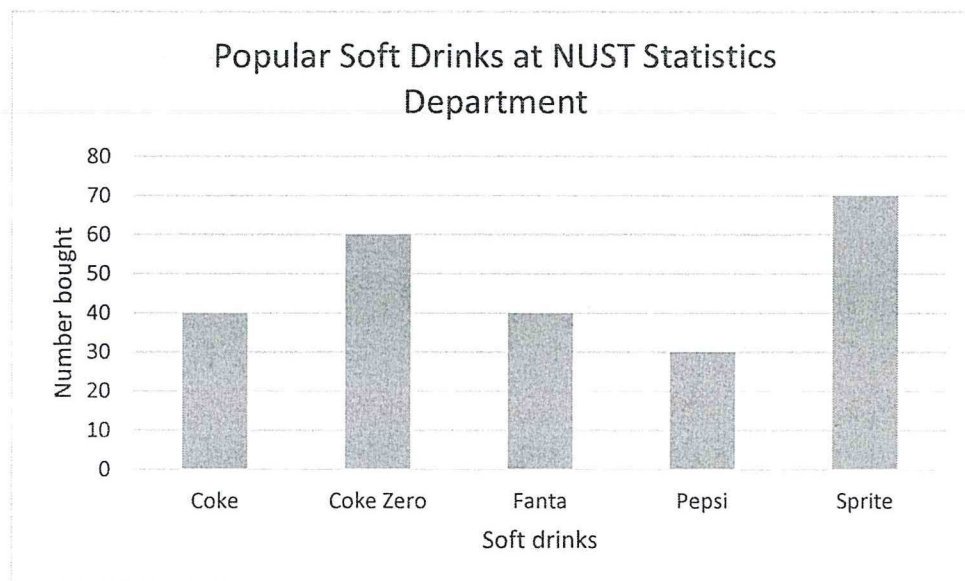
Which of the following statement is correct? [2]

    A. The data type of the soft drinks is categorical
    B. 20% of the students prefer Coke Zero
    C. It is possible to calculate the mean of this data
    D. The type of data displayed is continuous
    E. The mode of this data is Coke

1.4 In a positively skewed distribution, the mean is: [2]

    A. Below the median
    B. Above the median
    C. Equal to the median
    D. Below the mode
    E. None of the above

1.5 Which of the following descriptive measures cannot be read off from an ogive?

    A. The mean [2]
    B. The lower quartile
    C. The median
    D. The upper quartile
    E. The 70th percentile

1.6 If a random variable follow a Poison distribution, then the:

    A. Mean equals the variance
    B. Mean equals the standard deviation
    C. Median equals the standard deviation
    D. Median equals the variance
    E. None of the above [2]

1.7 What is the variance and the mean of the following five numbers?

10, 10,10,10,10

    A. Mean= 0 and variance = 0
    B. Mean = 0 and variance = 10
    C. Mean = 10 and variance = 10
    D. Mean = 10 and variance = 0
    E. All of the above

1.8 A Subjective probability is a probability: [2]

    A. Very close to zero
    B. Very close to one
    C. Base on individual judgement

D. Where all the chances are equally likely

E. All of the above

1.9 If the union of sets A and B is equal to the sample space, then A and B: [2]

A. Are mutually exclusive events

B. Are Statistically independent events

C. Are collectively exhaustive events

D .Are disjoint events

E. Are dependent events

1.10 A local bottling company has determined the number of machine breakdowns per month and their respective probabilities as shown below:

Number of break downs	0	1	2	3	4
Probability	0.12	0.38	0.25	0.18	0.07

The expected number of machine breakdowns per month is: [2]

A. 2

B. 1.7

C. 0.25

D. 0.18

E. 0.07

SECTION B

QUESTION 2 [24 MARKS]

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

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

199, 209, 202, 208, 212, 200, 210, 215, 203, 2 18, 208

Find the following:

2.1.1 Mean [3]

2.1.2 Median [3]

2.1.3 Mode [1]

2.1.4 Variance [3]

2.1.5 Standard deviation [2]

2.1.6 Coefficient of Variation [2]

2.2. The data below shows the number of mopanie worms sold by 40 women

at Wernhill open market on 30 January 2019.

41, 51, 21, 12, 0, 3, 17, 18, 21, 22, 42, 43, 45, 18, 18, 21, 26,

31, 27, 12, 26, 27, 28, 47, 30, 31, 32, 32, 32, 32, 33, 33, 35, 35,

38, 29, 29, 19, 36, 38

2.2.1. Display the data using an ordered stem- and- leaf plot. [5]

2.2.2. Comment on the shape of the distribution shown by this data. [1]

2.2.3. Using the classes: 0-10, 10-20, 20-30, etc., construct a frequency distribution
table for this data. [4]

QUESTION 3 [18 MARKS]

3.1. A biased coin is tossed twice. If the probability of getting a head (H) after a

toss is 0.45 and that of getting a tail (T) is 0.55

3.1.1. Draw a tree diagram to represent the above probability experiment

and list the possible outcomes. [3]

(Hint: Use H to denote Head and T to denote Tail)

3.1.2. Write down the sample space. [3]

3.1.3. What is the probability that the two tosses gives same result? [3]

3.1.4. What is the probability that the two tosses are different? [3]

3.2. Nashua printing company at NUST has two printing machines for printing COLL

study guides. Machine A produces 65 % of the study guides each year and

machine B produces 35 % of the study guides each year. Of the production by

machine A, 10% are defective; for machine B the defective rate is 5%.

3.2.1. If a study guide is selected at random from one of the machines, what is the

probability that it is defective? [3]

3.2.2. If the quality inspector at NUST pick a study guide at random and discovers that it is defective, what is the chance that it came from Machine B? [3]

QUESTION 4 [16 MARKS]

The discrete random variable X has the probability function given as $P(X) = 0.1x$

for $x = 1, 2, 3$ and 4.

4.1. Represent this probability distribution in a tabular form [2]

4.2. Find the exact value of $P(X \leq 3)$ [2]

4.3. Find the exact value of $E(X)$ [3]

4.4. Find the exact value of $E(X^2)$ [3]

4.5. Calculate the value of $Var(X)$ [3]

4.6. Calculate the value of $Var(4X - 6)$ [3]

QUESTION 5 [22 MARKS]

5.1. An important part of NUST customer service of IT services is the speed at which the IT department can repair telephone faults. Past records have shown that 70 % of the faults can be repaired within a day. For the first three faults reported on a given day, what is the probability that:

5.1.1. Exactly three will be repaired on the same day. [3]

5.1.2 Fewer than two will be repaired on the same day [3]

5.1.3. At least two will be repaired on the same day. [3]

5.2. The number of bank robberies that occur in Windhoek city is described by a mean of 1.8 per day. Find the probability that:

5.2.1. No robbery will occur in a given day [3]

5.2.2. Exactly three robberies will occur in a day [3]

5.3. Pulse rates of adult men are approximately normally distributed with a mean of 70 and standard deviation of 8. What proportion of men have a pulse rate that is:

5.3.1. Greater than 76? [3]
5.3.2 Between 64 and 76? [4]

END OF EXAMINATION

Standard Normal Cumulative Probability Table
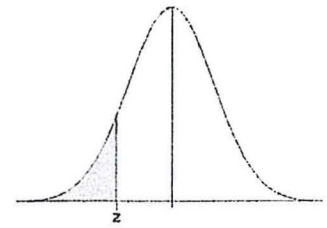
Cumulative probabilities for NEGATIVE z-values are shown in the following table:

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

Standard Normal Cumulative Probability Table

Cumulative probabilities for POSITIVE 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
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998