namibia university
OF SCIENCE AND TECHNOLOGY

Faculty of Health, Applied Sciences and Natural Resources

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	
QUALIFICATION CODES: 21BBAD / 07BMAR / 07BHR / 24BPN / 07BLSM	LEVEL: 6
COURSE: BASIC BUSINESS STATISTICS 1A	COURSE CODE: BBS111S
DATE: JUNE 2022	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	MR EM MWAHI, DR G DIBABA, MR J AMUNYELA, DR J MWANYEKANGE, MR S KASHIHALWA, MR A ROUX, MR G TAPEDZESA
MODERATOR:	MR J SWARTZ

THIS QUESTION PAPER CONSISTS OF 5 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 & 3** 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

1. Non-Programmable Calculator without the cover

ATTACHMENTS

1. Standard normal Z-table

QUESTION 1 [12 MARKS]

Write down the letter corresponding to the best answer for each question.

1.1 Which of the following is a measure of central tendency? [2]

    A. Variance   **B.** Standard deviation   **C.** Range   **D.** Median

1.2 If you are told a population has a mean of 25 and a variance of - 5, what must you conclude? [2]

    A. Someone has made a mistake

    B. There is only one element in the population

    C. There are no elements in the population

    D. None of the above

1.3 A proportion of a population is: [2]

    A. A sample   **B.** A population   **C.** A parameter   **D.** A statistic

1.4 Data that is recorded on a 1 non-rating scale (e.g. 1 = Namibia, 2 = South Africa, 3 = Angola, 4 = Zambia, 5 = Botswana) represents which data measurement scale? [2]

    A. Ordinal data   **B.** Continuous data   **C.** Interval data   **D.** Nominal data

1.5 In a symmetric data distribution, the mean is: [2]

    A. Below the median   **B.** Above the median

    C. Equal to the median   **D.** Below the mode

1.6 If P (A) = 0.10, P (B) = 0.40 and P (A and B) = 0.03, then A and B are: [2]

    A. Statistically dependent events

    B. Statistically independent events

    C. Non-mutually exclusive events

    D. Mutually exclusive events

QUESTION 2 [33 MARKS]

2.1 Weights of Carry-On Luggage in Kilograms for a random sample of 40 passengers returning from a vacation to Windhoek are listed below.

30	27	12	42	35	47	38	36	27	35
22	29	17	3	21	8	38	32	41	33
26	45	18	43	18	32	31	32	19	21
33	31	28	29	51	12	14	21	18	26

2.1.1 Construct an **ordered** stem and leaf display of the data. [5]

2.1.2 What shape of the distribution do you observes from the stem and leaf display? [2]

2.1.3 Using classes 0 to less than 10, 10 to less than 20, 20 to less than 30 etc…, construct a frequency distribution table for the data. [6]

2.1.4 What percentage of passengers recorded the weight of less than 35 Kilograms? [2]

2.2 The following data set lists the midterm scores received by 20 students in a Statistics class:

45	85	92	99	37	97	100	82	49	54
31	77	81	83	98	99	85	85	64	92

2.2.1 Calculate the mean score. [3]

2.2.2 Find the median score. [3]

2.2.3 Find the modal score. [1]

2.3 The number of days in a year that a sample of employees in a certain company were away from work due to illness is given in the table below.

Sick days	Number of employees
5 - < 8	67
8 - < 11	91
11 - < 14	67
14 - < 17	5

2.3.1 Calculate the mean sick days. [3]

2.3.2 Compute the variance. [4]

2.3.3 Calculate the modal sick days. [4]

3

QUESTION 3 [55 MARKS]

3.1 A bag contains 6 black balls and 14 white balls. Paul picks a ball at random from the bag and not replaces it back in the bag. He mixes the balls in the bag and then picks another ball at random from the bag.

    3.1.1 Construct a probability tree of the problem. [4]

    3.1.2 What is the probability that Paul picks two black balls? [2]

    3.1.3 What is the probability that Paul picks a black ball in his second draw? [3]

3.2 A company has 1 000 credit customers. They are classified according to the *size* of the *account balance* and the *timeliness of* their payments. The following table shows some of the numbers of customers being in various categories.

Last payment	Account balance			Total
	<N$100	N$100 to N$500	>N$500	
On time	....	450	....	850
Late	....	....	30	....
Total	200	500	......	....

    3.2.1 Copy the table and fill in all the missing values. [7]

    3.2.2 How many customers have a balance of less than N$100 or made their last payment late? [3]

3.3 The probability function of a discrete random variable X is summarised in the table below:

X	2	4	6	7
P(X)	0.03	C	0.5	0.35

    3.3.1 Find the value of C [3]

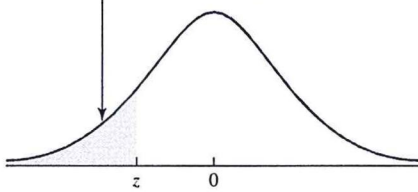   3.3.2 Find $P(X \geq 4)$ [3]

    3.3.3 Find the $E(X)$ [5]

    3.3.4 Find $Var(1+5X)$ [6]

3.4   A shoe store's records show that 30% of the customers purchase by credit card. This morning 20 customers purchased shoes from the store.

    3.4.1   Find the probability that at most 3 of the customers used a credit card.   [5]

    3.4.2   What is the probability that at least 3 customers but not more than 6 used a credit card?   [4]

    3.4.3   What is the expected number of customers using a credit card?   [2]

3.5   Weekly purchases of petrol at a garage are normally distributed with a mean of 5000 litres and a standard deviation of 2000 litres. What is the probability that in a given week, the purchases will be:

    3.5.1   Between 2500 and 5000 litres.   [5]

    3.5.2   More than 3760 litres.   [3]

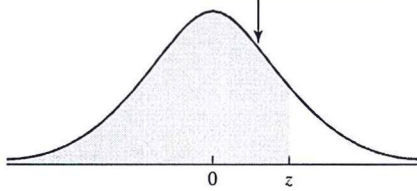==================END OF EXAMINATION==================

e.g., for z = −1.34, refer to the −1.3 row and the 0.04 column to find the cumulative area, 0.0901.

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
−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

Source: Cumulative standard normal probabilities generated by Minitab, then rounded to four decimal places.

e.g., for z = 1.34, refer to the 1.3 row and the 0.04 column to find the cumulative area, 0.9099.

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