UGANDA MARTYRS UNIVERSITY

UNIVERSITY EXAMINATIONS

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS

END OF SEMESTER FINAL ASSESSMENT

SEMESTER I 2021/22

FIRST YEAR EXAMINATIONS FOR BACHELOR OF BUSINESS
ADMINISTRATION AND MANAGEMENT
(BAM I, BSc.ENM, BSc. Acc.& Fin. I)

Business Statistics

STA 1101

DATE : 11th Mar. 2022
TIME : 9:30 AM - 12:30 PM
DURATION: 3 Hrs

Instructions

1. *Carefully read through ALL the questions before attempting.*

2. *ANSWER FOUR (4)Questions (All questions carry equal marks).*

3. *Ensure that your **Reg. number** is indicated on all pages of your work.*

4. *Ensure that your work is **clear** and **readable**. Untidy work will be penalized.*

5. *Any type of examination Malpractice will lead to automatic disqualification.*

6. *Do not write anything on the question paper.*

QUESTION ONE

(a)   (i) Why should you employ sampling than making an attempt to cover the entire population while collecting data.   [2 Marks]

    (ii) Suppose you are assigned to collect information relating to online teaching and learning at Nkozi University. Briefly explain how you could use systematic sampling to select a sample of 15 students from the 75 third year students at your campus and outline the major methods you would use to get the information.   [6 Marks]

(b) Distinguish between

    (i) Element and Subject.   [2 Marks]

    (ii) Statistic and parameter.   [2 Marks]

    (iii) Cluster sampling and Stratified random sampling.   [2 Marks]

    (iv) Descriptive statistics and Inferential statistics.   [2 Marks]

(c) The table below shows the weight of 42 bunches of matooke

70	74	67	59	50	55
62	70	49	65	48	67
60	84	57	49	60	45
72	60	59	55	58	57
53	65	66	60	51	62
72	60	50	57	80	78
84	79	69	80	71	53

    (i) Construct a frequency table starting with classes $40 - < 50$, $50 - < 60$.   [3 Marks]

    (ii) Present this data on a histogram. Hence estimate the mode.   [6 Marks]

QUESTION TWO

The table below shows coffee production by a group of farmers in Kayunga District in the year 2021

Bags produced	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59
Number of farmers	2	6	8	16	14	12	4	2

Calculate the

(a) mean using 32 as the assumed average ,   [6 Marks]

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(b) mode, [4 Marks]

(c) median, [4 Marks]

(d) upper quartile, [5 Marks]

(e) standard deviation. [6 Marks]

QUESTION THREE

(a) Write TRUE or FALSE.

   (i) The average number of factory accidents can be used to model a Poisson distribution. [2 Mark]

   (ii) If X is a continuous random variable then $\int_{-\infty}^{\infty} f(x) \leq 1$. [2 Mark]

   (iii) The standard normal distribution has the variance as 1. [2 Mark]

   (iv) The Variance of a discrete random variable $3Y$
        is $9E(Y^2) - 9[E(Y)]^2$. [2 Mark]

   (v) If a fair coin is tossed 20 times, it is most likely that the tail will show up 10 times. [2 Marks]

(b) A discrete random variable X has a probability mass function defined by

$$P(X) = \begin{cases} (2^x)c, & x=0,1,2,3,4,5,6; \\ 0, & \text{elsewhere.} \end{cases}$$

Determine the value of c. [5 Marks]

(c) A discrete random variable X has a distribution given by

X	-1	0	1	2	3	4	5	6
$P(X = x)$	$\frac{1}{20}$	$\frac{1}{20}$	m	$\frac{3}{20}$	$\frac{6}{20}$	$\frac{2}{20}$	$\frac{3}{20}$	$\frac{1}{20}$

Find (i) $E(X)$, (ii) $Var(X)$, (iii) $E(2X + 3)$ and (iv) $Var(3X - 4)$. [10 Marks]

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QUESTION FOUR

(a) (i) State any three axioms of probability. [3Marks]

   (ii) MAZIMA Property Masters Ltd sells 3 houses on average per week. What is the probability that they will sell exactly 4 houses this week? [4 Marks]

(b) It is known that 8 out of every 40 people that visit MTN Service Centre at Masaka buy data bundles. Find the probability that 2 out of the 5 people planning to visit the centre will not buy data bundles. [5 Marks]

(c) The weight of maize flour bags in a store is normally distributed with mean weight 125 kg and Variance 25 kg. Find the probability that a bag picked at random from the store weighs between 114 and 139 kg. [5 Marks]

(d) A bag contains 5 red and 7 yellow apples. If three apples are picked from the bag without replacement, find the probability that they are
of the same colour. [8 Marks]

QUESTION FIVE

The table below shows sales records in two business outlets X and Y over a period of 11 weeks.

Outlet (X)	28	20	40	28	21	31	36	29	33	24	45
Outlet(Y)	30	20	40	28	22	35	35	27	31	23	47

(a) (i) Plot a scatter diagram for the given data. [3 Marks]

   (ii) Find the equation of the regression line in the form $y = mx + c$. [8 Marks]

   (iii) Fit the regression line in (ii)to the scatter plot in (i). [4 Marks]

   (iv) Estimate the sales by Outlet X for a recorded sales of 50 by Outlet Y. [2 Marks]

(b) Calculate the Spearmann's rank correlation coefficient for the data and comment on your result. [8 Marks]

End

CUMULATIVE NORMAL DISTRIBUTION TABLE

CUMULATIVE NORMAL DISTRIBUTION $P(z)$

z	0	1	2	3	4	5	6	7	8	9
0.0	0.0000	0040	0080	0120	0160	0199	0239	0279	0319	0359
0.1	0.0398	0438	0478	0517	0557	0596	0636	0675	0714	0753
0.2	0.0793	0832	0871	0910	0948	0987	1026	1064	1103	1141
0.3	0.1179	1217	1255	1293	1331	1368	1406	1443	1480	1517
0.4	0.1554	1591	1628	1664	1700	1736	1772	1808	1844	1879
0.5	0.1915	1950	1985	2019	2054	2088	2123	2157	2190	2224
0.6	0.2257	2291	2324	2357	2389	2422	2454	2486	2517	2549
0.7	0.2580	2611	2642	2673	2704	2734	2764	2794	2823	2852
0.8	0.2881	2910	2939	2967	2995	3023	3051	3078	3106	3133
0.9	0.3159	3186	3212	3238	3264	3289	3315	3340	3365	3389
1.0	0.3413	3438	3461	3485	3508	3531	3554	3577	3599	3621
1.1	0.3643	3665	3686	3708	3729	3749	3770	3790	3810	3830
1.2	0.3849	3869	3888	3907	3925	3944	3962	3980	3997	4015
1.3	0.4032	4049	4066	4082	4099	4115	4131	4147	4162	4177
1.4	0.4192	4207	4222	4236	4251	4265	4279	4292	4306	4319
1.5	0.4332	4345	4357	4370	4382	4394	4406	4418	4429	4441
1.6	0.4452	4463	4474	4484	4495	4505	4515	4525	4535	4545
1.7	0.4554	4564	4573	4582	4591	4599	4608	4616	4625	4633
1.8	0.4641	4649	4656	4664	4671	4678	4686	4693	4699	4706
1.9	0.4713	4719	4726	4732	4738	4744	4750	4756	4761	4767
2.0	0.4772	4778	4783	4788	4793	4798	4803	4808	4812	4817
2.1	0.4821	4826	4830	4834	4838	4842	4846	4850	4854	4857
2.2	0.4861	4864	4868	4871	4875	4878	4881	4884	4887	4890
2.3	0.4893	4896	4898	4901	4904	4906	4909	4911	4913	4916
2.4	0.4918	4920	4922	4925	4927	4929	4931	4932	4934	4936
2.5	0.4938	4940	4941	4943	4945	4946	4948	4949	4951	4952
2.6	0.4953	4955	4956	4957	4959	4960	4961	4962	4963	4964
2.7	0.4965	4966	4967	4968	4969	4970	4971	4972	4973	4974
2.8	0.4974	4975	4976	4977	4977	4978	4979	4979	4980	4981
2.9	0.4981	4982	4982	4983	4984	4984	4985	4985	4986	4986
3.0	0.4987	4990	4993	4995	4997	4998	4998	4999	4999	5000

ADD

1	2	3	4	5	6	7	8	9
4	8	12	16	20	24	28	32	36
4	8	12	16	20	24	28	32	35
4	8	12	15	19	22	27	31	35
4	8	11	15	19	22	26	30	34
4	7	11	14	18	22	25	29	32
3	7	10	14	17	21	24	27	31
3	6	10	13	16	19	23	26	29
3	6	9	12	15	19	22	25	28
3	6	9	12	15	18	21	24	27
3	6	8	11	14	17	20	22	25
3	5	8	11	13	16	19	22	24
3	5	8	10	13	16	18	21	23
2	5	7	10	12	15	17	20	22
2	5	7	10	12	14	17	19	22
2	4	7	9	11	13	15	18	20
2	4	6	8	11	13	15	17	19
2	4	6	8	10	12	14	16	18
2	4	6	8	10	11	13	15	17
2	4	5	7	9	11	13	14	16
2	3	5	6	8	10	11	13	14
1	3	4	6	7	8	10	11	13
1	2	4	5	6	7	8	10	11
1	2	3	4	5	6	7	9	9
1	2	3	3	4	5	6	7	8
1	1	2	3	4	4	5	6	6
1	1	2	2	3	4	4	5	5
0	1	1	2	2	3	3	4	4
0	1	1	2	2	2	3	3	4
0	1	1	1	2	2	2	3	3
0	0	1	1	1	2	2	2	2
0	0	1	1	1	1	1	2	2

LIST OF MATHEMATICAL FORMULAE

1. Population Variance: $\sigma^2 = \left(\dfrac{\Sigma f x^2}{\Sigma f}\right) - \left(\dfrac{\Sigma f x}{\Sigma f}\right)^2$.

2. Random variables: Expected value of X is given by

$$E(X) = \sum x.P(x)$$

$$\text{Var}(X) = \sigma^2 = E(X^2) - [E(X)]^2$$

3. Binomial distribution:

$$P(X = r) = {}^nC_r p^r q^{n-r}.$$

4. Poisson distribution: $P(X = x) = \dfrac{e^{-\lambda}\lambda^x}{x!} \quad x = 0, 1, 2, 3, 4...., \quad \lambda > 0.$

5. The regression line of y on x is given by $y = mx + c$ where

$$m = \frac{S_{xy}}{S_{xx}}$$

$$S_{xy} = \Sigma xy - \frac{\Sigma x \Sigma y}{n}$$

$$S_{xx} = \Sigma x^2 - \frac{(\Sigma x)^2}{n}$$

and

$$c = \frac{\Sigma y - m\Sigma x}{n}$$

6. Spearmann's rank correlation coefficient is

$$\rho = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)}.$$

7. Confidence interval for the population mean is

$$\bar{x} \pm z_* \frac{\sigma}{\sqrt{n}}.$$