UNIVERSITY
OF
JOHANNESBURG

FACULTY/COLLEGE	COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL	SCHOOL OF MANAGEMENT
DEPARTMENT	BUSINESS MANAGEMENT CEP's
CAMPUS	APB
MODULE NAME	QUANTITATIVE TECHNIQUES 1B
MODULE CODE	ADBQ01B
SEMESTER	SECOND
ASSESSMENT OPPORTUNITY, MONTH AND YEAR	Supplementary NOVEMBER 2020

ASSESSMENT DATE	04 NOVEMBER 2020	SESSION	Supplementary
ASSESSOR	Mr E. KANDE		
MODERATOR	Mr. DELPHIN KAMANDA		
DURATION	2 HOURS	TOTAL MARKS	100

NUMBER OF PAGES OF QUESTION PAPER (Including cover page)	13

INFORMATION/INSTRUCTIONS:
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- This is a closed-book assessment.

- Question papers must be handed in together with your answer books.

- Read the questions carefully and answer only what is asked.

- Answer all the questions:

  - **Section A** Indicate the correct answer as per the instructions.

  - Answer **Section B** in the answer book.

  - The formula sheet and the normal distribution table are provided in the two last pages

- Number your answers clearly.

- Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.

- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.

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SECTION A

QUESTION 1

Which one of the following is not the basic properties of a probability?

A. A probability value lies only between 0 and 1.
B. If an event A cannot occur, then P(A)=0
C. If an event A is certain to occur, then P(A)=1
D. The sum of the probabilities of all possible outcomes of a random experiment is more than 1.
E. If P(A) is the probability of event A occurring, then the probability of event A not occurring is defined as : $P(\bar{A})$ =1- P(A)

QUESTION 2

A priory probability is:

A. When the possible outcomes are known in advance
B. When the values of r and n are not known in advance and have to be observed empirically through data collection.
C. When the probability of an event is based on an expert opinion or just plain intuition.
D. When the mathematical formula is used to compute the probabilities.
E. None of the above

QUESTION 3

Two events are said to be statistically independent if:

A. The occurrence of event A has effect on the outcome of event B occurring and visa versa.
B. The occurrence of event A has no effect on the outcome of event B occurring and visa versa.
C. The probability of event A has effect on the probability of event B
D. The events are mutually exclusive
E. None of the above

QUESTION 4

Events are mutually exclusive if:

A. They cannot occur together on a single trial of a random experiment.
B. The events can occur together on a single trial of a random experiment.
C. The events are independents
D. P(A ∩B)≠0
E. None of the above

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QUESTION 5

Which of the following expressions define a Joint probability of two events A and B?

    A. P (A ∩B)
    B. P (A U B)
    C. P (A or B)
    D. P(A)
    E. P(B)

Use the information below and answer the questions 6 to 10

Industry type	Company size (in R million turnover)			Total
	Small (0 to <R10)	Medium (10 to < 50)	Large (+ than 50)	
Mining	0	0	35	**35**
Finance	9	21	42	**72**
Service	6	3	1	**10**
Retail	14	13	6	**33**
Total	**29**	**37**	**84**	**150**

QUESTION 6

The joint probability of retail and large is?

    A. $\frac{14}{150}$
    B. $\frac{14}{150}$
    C. $\frac{6}{150}$
    D. $\frac{33}{150}$
    E. $\frac{13}{150}$

QUESTION 7

What is the probability of selecting a finance industry?

    A. $\frac{9}{150}$
    B. $\frac{21}{150}$
    C. $\frac{42}{150}$
    D. $\frac{72}{150}$
    E. $\frac{29}{150}$

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QUESTION 8

What is the probability of selecting a small company?

A. $\frac{9}{150}$

B. $\frac{21}{150}$

C. $\frac{42}{150}$

D. $\frac{72}{150}$

E. $\frac{29}{150}$

QUESTION 9

What is the probability of selecting either small or large company? In other words, calculate P (A U B) where A event consists to select small company, B large company.

A. $\frac{113}{150}$

B. $\frac{21}{150}$

C. $\frac{42}{150}$

D. $\frac{72}{150}$

E. $\frac{29}{150}$

QUESTION 10

What is the probability of selecting the service large company?

A. $\frac{9}{150}$

B. $\frac{21}{150}$

C. $\frac{1}{150}$

D. $\frac{72}{150}$

E. $\frac{29}{150}$

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QUESTION 11

Which of the following statement is not a characteristic of the normal distribution?

A. It is bell shaped
B. It is symmetrical about a central value,μ.
C. The area under the curve equals one.
D. It is asymmetrical about a central value, ,μ.
E. A normally distributed random variable is described by a mean and standard deviation.

QUESTION 12

The mean of population parameter in sampling distribution is represented by the symbol?

A. μ_x
B. σ
C. π
D. $\propto$
E. $\bar{x}$

QUESTION 13

The standard deviation of population parameter in sampling distribution is represented by the symbol?

A. μ_x

B. σ

C. π

D. $\propto$

E. $\bar{x}$

QUESTION 14

Which of the following option is not the components of a time series?

A. Trend (T)
B. Cyclical variations (C)
C. Seasonal variations (S)
D. Radiant
E. Random (Irregular) variations

QUESTION 15

The trend can be defined as?

    A. The medium to long term deviations from
    B. The fluctuations that are repeated periodically, usually within a year.
    C. A long term smooth underlying movement in a time series.
    D. Irregular fluctuations
    E. Unpredictable occurrences.

QUESTION 16

The least squares equation $Y = a + b(x)$ is used to predict the value of (x). The equation the dependent variable is:

    A. a
    B. Y
    C. X
    D. B
    E. None of the above

QUESTION 17

From the equation above b is?

    A. Intercept
    B. Slope or gradient
    C. Constant
    D. Dependent variable
    E. independent

QUESTION 18

The factorial of 0 is?

    A. 1
    B. 0
    C. -1
    D. ∞
    E. None of the above

Use the information and answer the questions 19 to 22

Sales units	1	2	3	4	5
Probability	0.20	0.25	?	0.30	0.10

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QUESTION 19

The missing probability is equal?

   A. 1
   B. 0.5
   C. 0.15
   D. 0.20
   E. -0.10

QUESTION 20

Calculate the expected value?

   A. 2.85
   B. 2.4
   C. 2.6
   D. 3
   E. 2.75

QUESTION 21

Calculate the variance?

   A. 1.73
   B. 1.82
   C. 1.27
   D. 1.76
   E. 1.77

QUESTION 22

Calculate the standard deviation?

   A. 1.32
   B. 1.35
   C. 1.13
   D. 1.33
   E. 1.01

QUESTION 23

For a given problem situation, there are certain essential conditions that need to be solved by using linear programming. Which of the following option is incorrect?

   A. Limited resources

   B. Maximize the profits or minimize the cost
   C. Homogeneity
   D. Non-divisibility
   E. None of the above

QUESTION 24

Which of the following is not a property of the linear programming model?

    A. The relationship among decision variables must be non-linear in nature

    B. The model must have an objective function
    C. Resource constraints are essential
    D. A model must have a non-negativity constraint
    E. None of the above

QUESTION 25

A simple index number measures the changes in price or quantity of a single item over time. Which of the following is not in the steps of calculating the simple index number?

    A. Obtain the prices or quantities for the product over the time of interest

    B. Select the period to be used as base
    C. Multiply the current price of the commodity by the base price
    D. Multiply the ratio by 10
    E. None of the above

SECTION B [75 MARKS] DK.E

QUESTION 1 (30 marks)

1.1 In a survey at a testing station 1530 people were polled after taking their driver's license test. The results of the survey are as follows:

	Test failed	Test passed	TOTAL
Male	463	**B**	782
Female	**A**	**C**	**D**
TOTAL	913	617	1530

1.1 calculate the values of A, B, C and D (8)

1.2 calculate the probability of choosing at random, a female who passed the test (2)

1.3 calculate the probability of choosing at random, a male who passed the test (2)

1.4 calculate the probability of choosing at random, a female who failed the test (2)

1.5 calculate the probability of choosing at random, a male who failed the test (2)

1.2

It takes on average, 70 minutes with a standard deviation of 10 minutes to assemble a particular microcomputer.

Assume that assembly time is normally distributed.

What is the probability that a given micro-computer?

1.2.1 Takes between 70 and 80 minutes to be assembled? (5)
1.2.2 Be assembled within 62 minutes? (4)
1.2.3 Take between 56 and 72 minutes to be assembled? (5)

QUESTION 2 [21 marks]

You are given the information in the table below:

	Prices (R) per Kg		Quantities per Kg	
	2019	2020	2019	2020
Breads	12	15	600	500
Meat	65	70	400	400
Sugar	18	25	200	200

Use 2019 as base year, Calculate and interpret.

2.1 the Laspeyres index (7)

2.2 the Paasches index. (7)

2.3 For instance, the minimum wage per hour increases from R20 to R 20.76 from 2019 to 2020. Determine if the purchasing power of improved or deteriorate? (Hint calculate the increase in minimum wage per hour and compare with Laspeyres or Paasches index) Show your calculation. (7)

QUESTION 3 [24 marks]

A tyre manufacturer found that the sample mean tread life of 49 radial tyres tested was 52,345 km. it is also known that the population standard deviation is 12,943 km.

3.1.1 Construct a 99 % confidence interval estimate for the true mean tread life of all radial tyres manufactured. Also interpret the results. (8)
3.1.2 Construct a 95 % confidence interval estimate for the true mean tread life of all radial tyres manufactured. Also interpret the results. (8)
3.1.3 Construct a 90 % confidence interval estimate for the true mean tread life of all radial tyres manufactured. Also interpret the results. (8)

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Formula sheet

- **Laspeyres index**

$$I_{P(L)} = \frac{\sum p_i Q_b}{\sum P_b Q_b} \times 100$$

-
    Paasches index

$$I_p(P) = \frac{\sum P_i Q_i}{\sum P_b Q_i} \times 100$$

- **Permutation**

nP(r)

- **Combination**

nC(r)

- **The addition rule**

P (A U B) = P (A) + P (B) – P (A ∩ B)

The multiplication rule

P (A ∩ B) = P (A) x P (B)

- **Expected value**

$$\mu = E(X) = \sum_{i=1}^{N} X_i P(X_i)$$

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$$b = \frac{\sum xy - \sum x \sum y}{n \sum x^2 - (\sum x^2)}$$

$$a = \frac{\sum y}{n} - b \frac{\sum x}{n}$$

$\hat{y} = a + bx$

- **Estimation confidence interval**

$$\mu = \bar{x} \pm z \cdot \frac{\sigma}{\sqrt{n}}$$

- **Normal distribution**

$$Z = \frac{x - \mu}{\delta}$$

- **Proportion**

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The standard normal distribution (z)

This table gives the area under the standard normal curve between 0 and z

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	0.1027	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	0.2703	0.2734	0.2764	0.2793	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	0.3557	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	0.48928	0.48956	0.48983	0.49010	0.49036	0.49061	0.49086	0.49111	0.49134	0.49158
2.4	0.49180	0.49202	0.49224	0.49245	0.49266	0.49286	0.49305	0.49324	0.49343	0.49361
2.5	0.49379	0.49396	0.49413	0.49430	0.49446	0.49461	0.49477	0.49492	0.49506	0.49520
2.6	0.49534	0.49547	0.49560	0.49573	0.49585	0.49598	0.49609	0.49621	0.49632	0.49643
2.7	0.49653	0.49664	0.49674	0.49683	0.49693	0.49702	0.49711	0.49720	0.49728	0.49736
2.8	0.49744	0.49752	0.49760	0.49767	0.49774	0.49781	0.49788	0.49795	0.49801	0.49807
2.9	0.49813	0.49819	0.49825	0.49831	0.49837	0.49841	0.49846	0.49851	0.49856	0.49861
3.0	0.49865	0.49869	0.49874	0.49878	0.49882	0.49886	0.49889	0.49893	0.49897	0.49900
3.1	0.49903	0.49906	0.49910	0.49913	0.49916	0.49918	0.49921	0.49924	0.49926	0.49929
3.2	0.49931	0.49934	0.49936	0.49938	0.49940	0.49942	0.49944	0.49946	0.49948	0.49950
3.3	0.49952	0.49953	0.49955	0.49957	0.49958	0.49960	0.49961	0.49962	0.49964	0.49965
3.4	0.49966	0.49968	0.49969	0.49970	0.49971	0.49972	0.49973	0.49974	0.49975	0.49976
3.5	0.49977	0.49978	0.49978	0.49979	0.49980	0.49981	0.49981	0.49892	0.49983	0.49983
3.6	0.49943	0.49985	0.49985	0.49986	0.49986	0.49987	0.49987	0.49988	0.49988	0.49989
3.7	0.49989	0.49990	0.49990	0.49990	0.49991	0.49991	0.49991	0.49992	0.49992	0.49992
3.8	0.49993	0.49993	0.49993	0.49994	0.49994	0.49994	0.49994	0.49995	0.49995	0.49995
3.9	0.49995	0.49995	0.49996	0.49996	0.49996	0.49996	0.49996	0.49996	0.49997	0.49997
4.0	0.49997	0.49997	0.49997	0.49997	0.49997	0.49997	0.49998	0.49998	0.49998	0.49998

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