EASTERN UNIVERSITY, SRI LANKA

Faculty of Commerce and Management

nd Year Second Semester Examination in Bachelor of Business Administration / Bachelor of Commerce - 2016/2017 (Jan 2019)
(Proper/Repeat)

COM 2053 Business Statistics

THREE (03) HOURS

To be completed by the candidate:
Examination Index Number: ....

Instructions to Candidates	For Examiner's Use only	
	Question No	Marks
1. This paper has **05** questions in **16** pages.	01	
2. Answer **all the questions** in **three** hours.	02	
3. Write your answers clearly in the spaces provided on the examination paper.	03	
4. This paper should be handed over personally to the supervisor/ invigilator	04	
	05	
	Total	

Underline the appropriate answer for the following questions from the given choices.

1. A statistics professor surveys the students in her class and finds that 20% are males and 80% are females. This is an example of

   A. inferential statistics B. nominal data C. descriptive statistics D. secondary data.

2. Mu (μ) is an example of a

   A. population parameter B. sample statistic C. population variance D. mode

3. What method is used to sample a population so that it is representative of the population?

   A. The observations that have the lowest and highest values are selected.
   B. Every element in a population is chosen.
   C. Only the first half of a population is selected.
   D. Samples are chosen at random from the population

4. The collection of one or more outcomes from an experiment is called

   A. probability B. event C. random variable D. random experiment

5. Patients arrive at a hospital accident and emergency department at random at a rate of 6 per hour. Now, the time is 11.30 a.m. What is the probability that the next patient arrives before 11.45 a.m.?

   A. 0.3345 B. 0.7769 C. 0.9975 D. 0.0149

6. Suppose a population has mean $\mu = 8$ and standard deviation $\sigma = 3$. Suppose a random sample of size $n = 36$ is selected. What is the probability that the sample mean is between 7.8 and 8.2?

   A. 0.0558 B. 0.6554 C. 0.3108 D. 0.5279

7. The method of least squares dictates that we choose a regression line where the sum of the square of deviations of the points from the line is

   A. maximum B. minimum C. zero D. positive

8. When regression line passes through the origin, then:

   A. Intercept is zero B. Regression coefficient is zero
   C. Correlation is zero D. Association is zero

9. Finding the centred four - quarter moving average helps us identify the

   A. cyclical component B. trend component
   C. seasonal component D. irregular component

10. An overall upward or downward pattern in an annual time series would be contained in which component of the times series:

    A. Trend B. Cyclical C. Irregular D. Seasonal

Write true or false in the given space for the following statements:

Bric

11. A measured characteristic of the sample is called a parameter:______________

12. Graphs, charts and tables that we use to display data by making it easier to understand are all descriptive statistics:______________

13. A random variable that has a normal distribution with mean zero and standard deviation one is a standard normal probability distribution:______________

14. Approximately 95.5 percent of the values of a random variable in a normally distributed popula within ± 3σ standard deviation from the mean:______________

15. Total area under the normal curve remains 1 and it is true for all continuous probability distributions:______________

Fill in the blanks with appropriate answer:

16. The strength of the relationship between x and y variables can be identified by __________

17. A sampling method in which sample members from a larger population are selected according t starting point and a fixed, periodic interval is called ______________________

18 The ______________ component of a time series measures the fluctuations in a time series due economic conditions of prosperity and recession with duration of approximately 2 years or longe

19. The three major measures of central tendency are the ______________, the ____________ ar ______________.

20. In a ______________ probability, the probability of success is based on prior knowledge of the involved and in the ______________ probability approach, the probabilities are based on obse not on prior knowledge of a process.

(20 x 1.5

Q3

i) U.S. companies spent more than $250 billion in advertising in 2018. The spending was as follows:

Media	Amount ($billions)
Direct mail	45
Internet	10
Magazines	24
Newspapers	50
Radio	26
TV	55
Other	46

a) A marketing student wants to construct a chart to compare the different advertisement modes. [...] appropriate chart that can fulfil his objective.

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b) Another marketing student wants to construct a chart to investigate the portion of each advertising [...] of the whole. Name an appropriate chart that can fulfil his objective.

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(1)

c) What conclusions can you reach concerning how U.S. companies spend their advertising dollars?

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(1)

The following data represent the cost of electricity during July 2018 for a random sample of 50 one-room apartments in a large city:

Row Data on Utility Charges ($)

96	171	202	178	147	102	153	197	127	82
157	185	90	116	172	111	148	213	130	165
141	149	206	175	123	128	144	168	109	167
95	163	150	154	130	143	187	166	139	149
108	119	183	151	114	135	191	137	129	158

a) Form a frequency distribution, a percentage distribution and a cumulative percentage distribution that have class intervals with the upper class boundaries $99, $119, and so on.

Utility Charges ($)	Tally	Frequency	Percentage	Cumulative Percentage
Total	-			-

(3 Marks)

b) Construct a histogram and a frequency polygon on the same graph.

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(2 Marks)

c) Around what amount does the monthly electricity cost seem to be concentrated?

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iii) The number of days that students were missing from University due to sickness in one year was as follows:

Number of days off sick	1-5	6-10	11-15	16-20	21-25
Frequency	12	11	10	4	3

a) Estimate the mean and median days off sick.

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b) Find the variance and standard deviation.

(3 Marks)

c) Based on the measures calculated in the above two parts, what would you conclude about the days off sick in one year at the University?

(2 Marks)

(Total: 20 Marks)

Q4 i) In a recent month, the percentage of orders filled correctly at KFC was approximately 86.1%. Yo[u]... friends of yours are planning to go to KFC this week.

a) What is the probability that all three orders will be filled correctly?

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b) What is the probability that none of the three will be filled correctly?

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c) What is the probability that at least two of the three will be filled correctly?

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(2 Marks)

d) What is the mean and standard deviation of the binomial distribution used in (a) to (c)? Interpret these values.

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(2 Marks)

ii) Deleven Trucking Company determined that the distance travelled per truck per year is normally di[illegible] with a mean of 50.0 thousand miles and a standard deviation of 12.0 thousand miles.

a) What proportion of trucks can be expected to travel between 34.0 and 50.0 thousand miles in th[illegible]

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b) What percentage of the trucks can be expected to travel either below 30.0 or above 60.0 thou[illegible] in the year?

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c) How many miles will be travelled by at least 80% of the trucks?

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(2 Marks)

iii) Suppose an editor of a publishing company claims that the mean time to write a textbook is less than 15 months. A sample of 16 textbook authors is randomly selected and it is found that the mean time taken by them to write a textbook was 12.5 months. Assume also that the standard deviation is known to be 3.6 months. Assuming the time to write a textbook is normally distributed and using a 0.05 level of significance, would you conclude the editor's claim is true?

a) Null and alternative hypotheses

H_0: ....

H_1: ....

b) Value of significance level (α): ....

c) Decision rule: ....

d) Test statistic:

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e) Statistical decision:

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f) Conclusion for decision making:

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(5 Mark

(Total: 20 Mark

5

i) In a small firm, the production of items and the cost during the previous 10 months are shown in t
below.

Production ('000 units)	10	8	5	4	6	9	10	12	7	11
Cost (Rs. '000)	22	20	16	11	12	19	15	20	13	24

a) Draw a scatter diagram for this data.

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b) Find the least squares regression line of cost on production and draw this line on the scatter diag

Production ('000)	Cost ('000)	XY	X^2
10	22		
8	20		
5	16		
4	11		
6	12		
9	19		
10	15		
12	20		
7	13		
11	24		

Regression Equation: ……………………………………………

(4 Marks)

c) Find the fixed cost of the firm.

d) If the production schedules for the next two months are (A) 10000 units (B) 15000 units, predic
cost for the next two months.

e) Discuss the reliability of the predictions you made in part (d)

ii) The following table shows the quarterly production figures (in millions of kg.) of a cement corp
four years.

Year	Q1	Q2	Q3	Q4
2015	33	31	48	64
2016	74	63	65	102
2017	113	112	118	125
2018	141	130	134	147

a) Calculate the 4-quarter centered moving averages for this data.

Year	Quarter	Production (Y)	4-Quarter MA	4 Quarter CMA	Specific Seasonal
2015	1				
	2				
	3				
	4				
2016	1				
	2				
	3				
	4				
2017	1				
	2				
	3				
	4				
2018	1				
	2				
	3				
	4				

(2 Marks)

b) Find the seasonal indices for each of the four quarters using the ratio to moving average method.

Year	Q1	Q2	Q3	Q4	
2015					
2016					
2017					
2018					
Total					
Mean					
Adjusted					

Correction factor: ....

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Seasonal Indices:

Q1:		Q2:		Q3:		Q4:	

c) Find the deseasonalized production figures for the four quarters of 2018.

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d) Forecast the production figures for the four quarters of 2019 using trend forecasts of 1
186.

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Standard Normal Probabilities

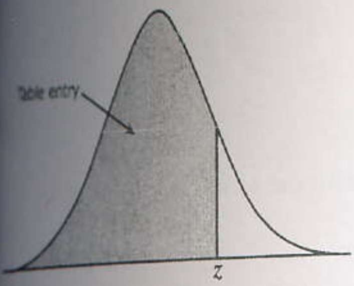

Table entry for z is the area under the standard normal curve to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

Standard Normal Probabilities

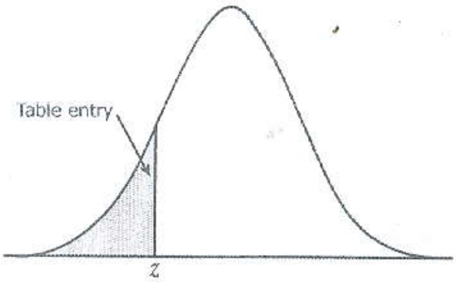

Table entry for z is the area under the standard normal cur[illegible] to the left of z.

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
−3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.000
−3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.000
−3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.000
−3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.000
−3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.001
−2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.001
−2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.001
−2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.002
−2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.003
−2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.004
−2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.006
−2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.008
−2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.011
−2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.014
−2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.018
−1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.023
−1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.029
−1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.036
−1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.045
−1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.055
−1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.068
−1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.082
−1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.09
−1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.11
−1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.13
−0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.16
−0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.18
−0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.21
−0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.24
−0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.27
−0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.31
−0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.34
−0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.38
−0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.42
−0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.46