EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
SECOND YEAR SECOND SEMESTER EXAMINATION IN
BACHELOR OF BUSINESS ADMINISTRATION/ BACHELOR OF
COMMERCE – 2018/2019 (JANUARY 2022) (REPEAT)
COM 2053 BUSINESS STATISTICS

Answer All Questions   **Time: 03 Hours**

01 (I)   "Insurance companies are interested in the mean health costs each year of their clients, so that they can determine the costs of health insurance."

Identify the following for the above scenario:
i) population; ii) sample; iii) parameter; iv) statistic; v) variable.

(05 Marks)

(II)   The following table shows the distribution of the cost of electricity during a particular month for a random sample 50 one bed room apartments in a large city.

Electricity cost (in rupees)	Frequency
80 - 99	4
100 - 119	7
120 - 139	9
140 - 159	13
160 - 179	9
180 - 199	5
200 - 219	3

i)   Construct a histogram.
ii) Comment the shape of the distribution of the cost of electricity of 50 apartments using the histogram constructed in part (i).
iii) Calculate the following:
a) Mean; b) Median; c) Mode; d) Standard deviation.

(15 Marks)

(Total 20 Marks)

02. (I)   The following table shows the probability distribution of number of mortgages approved per week at a particular financial institution.

Number of mortgages approved	0	1	2	3	4	5	6
Probability	0.10	0.10	0.20	0.30	0.15	0.10	0.05

i) Find the probability that at least three mortgages are approved per week.

ii) Find the expected number of mortgages approved per week.

iii) Find the standard deviation for the number of mortgages approved per week.

(06 Marks)

(II)   A company installs new central air conditioner and has found that for 15% of all installations a return visit is needed to make some modifications. Six installations were made in a particular week. Assume independence of outcomes for these installations.

i) What is the probability that a return visit was necessary in all of these cases?

ii) What is the probability that a return visit was necessary in none of these cases?

iii) What is the expected number of houses that will need a return visit?

iv) What is the standard deviation of the number of houses that will need a return visit?

(08 Marks)

(III)   The numbers of accidents in a production factory has a Poisson distribution with mean 2.6 per month.

i) For a given month, what is the probability there will be fewer than two accidents?

ii) For a given month, what is the probability there will be more than one accidents?

iii) What is the probability that there will be exactly 10 accidents next year?

(06 Marks)

(Total 20 Marks)

03. (I)   The time to download the homepage for a particular bank is normally distributed with a mean of 0.8 second and a standard deviation of 0.2 second. What is the probability that a download time is

i)   less than 1 second?

ii)   between 0.5 and 1.5 seconds?

iii)   above 0.5 second?

iv)   99% of the download times are above how many seconds?

(10 Marks

II)   The waiting time to check out of a supermarket has had a population mean of 10.73 minutes. Recently, in an effort to reduce the waiting time, the supermarket has experienced with a system in which there is a single waiting line with multiple checkout servers. A sample of 100 customers was selected, and their mean waiting time to check out was 9.52 minutes with a sample standard deviation of 5.8 minutes. At the 0.05 level of significance, is there evidence that the population mean waiting time to check out is less than 10.73 minutes?

(10 Marks)

(Total 20 Marks)

04.   A department store gives in service training to its salesmen followed by a test to consider whether it should terminate the services of any of the salesmen who do not qualify the test. The following data give the test scores and sales made by nine salesmen during a certain period.

Test score	14	19	24	21	28	22	15	20	19
Sales (1000 Rs)	31	36	48	37	50	45	33	41	39

i)   Construct a scatter plot and comment on the relationship between the test scores and sales.

ii)   Calculate the coefficient of correlation between the scores and the sales and interpret it.

iii)   Find the least squares linear regression line of sales on test score.

iv)   What is the impact of test scores on sales?

v)   How much of variations in sales is explained by test score?

iv)   If the department store wants a minimum sales volume of Rs 3000, what is the test score that will ensure continuation of the services?

(Total 20 Marks)

05.   The following data are the quarterly sales of a company over the last 3 years.

Year	Sales (in rupees 10000)			
	Q 1	Q 2	Q 3	Q 4
2019	20	40	60	15
2020	30	48	78	22
2021	52	65	95	35

i) Calculate the centered four-point moving average for the given time series.
ii) Determine the seasonal index for each of the four quarters using the ratio to moving average method.
iii) Forecast the demand for the four quarters of 2022 using trend forecasts of 55, 70, 90 and 42.

(Total 20 Marks)

Area Under Student t-Distribution
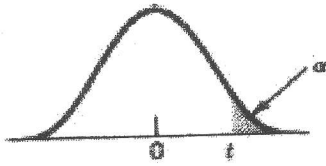
df \ α	.10	.05	.025	.01	.005
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
40	1.303	1.684	2.021	2.423	2.704
60	1.296	1.671	2.000	2.390	2.660
120	1.289	1.658	1.980	2.358	2.617
∞	1.282	1.645	1.960	2.326	2.576

Source: Paul G. Hoel, *Elementary Statistics*, 3rd ed. (New York: John Wiley & Sons, 1971).

Area Under Standard Normal Curve

P(0 < Z <z)
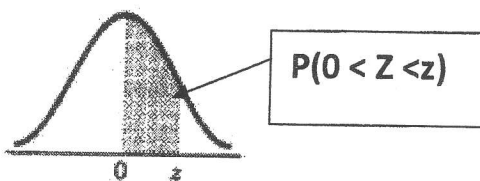
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3820
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990