Eastern University, Sri Lanka
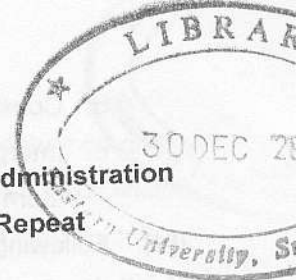
Faculty of Commerce and Management

Second Year Second Semester Examination in Bachelor of Business Administration

and Bachelor of Commerce 2009/2010 (December 2011) Proper/Repeat

COM 2053 Business Statistics

Time: 03 Hours

Number of Questions: 05

Answer All Questions

Number of Pages: 05

Calculators are permitted

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01. (I). Assumes that the following data represent trade relationship between the United States (U.S) and China in 2001.

Items	Exported to China (Billions of Dollars)	Imported from China (Billions of Dollars)
Electric and machinery	3.58	7.0
Metals	1.8	4.0
Plastics	1.3	6.3
Toys, games and sporting goods	1.56	11.0
Scientific Instruments	3.85	1.96

Show the above data using appropriate graphical technique and explain what differences are there between U.S goods exported to China and U.S goods imported from China.

(03 Marks)

(II). Briefly explain the terms of measures of central tendency and measures of dispersion.

(03 Marks)

(III). The following Stem and Leaf Display shows the details of marks obtained by 2nd year Students of a university in a particular subject.

Stem: 10s   Leaf Unit: 1   N= 91

Frequency	Stem	Leaf
5	3	5 8 8 9 9
6	4	2 4 4 8 8 8
11	5	1 1 1 1 2 2 3 7 7 8 8
20	6	2 2 3 3 3 4 4 4 5 5 6 6 6 6 8 8 8 9 9 9
27	7	3 3 3 3 4 4 4 4 5 5 5 5 5 5 5 5 5 5 6 6 6 7 7 7 7
14	8	1 1 2 2 2 2 3 3 3 4 4 4 5 5
8	9	1 1 1 5 5 7 7 7

a. Find first quartile, median, third quartile and mode of the distribution.

b. Construct box plot of the distribution.

c. Interpret the box plot and describe shape of the distribution using box plot and stem and leaf display. **(07 Marks)**

(IV). Following data shows average monthly sales of 100 small scale Grocery shops in the Batticaloa District. The data were collected as a sample for the research purpose.

Sales in Rs. ('000')	Below 20	20 - <40	40 -<60	60 -<80	80 -<100	Above 100
No.of Shops	10	37	20	16	10	7

a. Draw histogram.

b. Find the following Measures.

    i. Mean;   ii. Median;

    iii. Mode;   iv. Standard deviation.

c. Find skewness of the distribution and describe it. **(12 Marks)**

(Total Marks: 25 Marks)

02. (I). From the company records of the past 100 working days, the manager of an auto mobile dealership has summarised the number of cars sold per day into the following probability distribution.

Number of cars sold (x)	0	1	2	3	4	5	6
Probability P(x)	0.02	0.15	0.27	0.20	0.15	0.15	0.06

a. Compute mean or expected number of cars sold per day.

b. Compute the standard deviation of cars sold per day.

c. Find the probability on given day that:

    i. fewer than 4 cars sold per day;

    ii. atleast 4 cars sold per day;

    iii. exactly 4 cars sold per day. **(05 Marks)**

(II). When a customer places an order with AccTech's Online Office Supplies, a computerized accounting information system (AIS) automatically checks to see if the customer has exceeded his or her credit limit. Past records indicate that the probability of customers exceeding their credit limit is 0.05. Suppose that, on a given day, 20 customers place orders. Assume that the number of customers that the AIS detect as having exceeded their credit limit is distributed as a binomial random variable.

a. What are the mean and standard deviation of the number of customers

exceeding their credit limits?

b. What is the probability that none of the customers will exceed their credit limit?

c. What is the probability that one customer will exceed his or her credit limits?

d. What is the probability that two or more customer will exceed their limits?

(05 Marks)

(III). The number of arrivals at a car wash is Poisson distributed with a mean of 6 per hour.

a. What is the probability that 9 cars will arrive in the next hour?

b. What is the probability that fewer than 2 cars will arrive in the next 30 minutes?

(04 Marks)

(IV). A statistical analysis of long-distance telephone calls made from the headquarters of the Airtone Computer Corporation indicates that the length of these calls is normally distributed with mean $\mu = 240$ seconds and standard deviation $\sigma = 40$ seconds.

a. What percentage of these calls lasted less than 180 seconds?

b. What is the probability that a particular call lasted between 180 and 300 seconds?

c. What is the length of a particular call if only 1% of all calls are shorter?

d. If random samples of 100 telephone calls are selected, what is the probability that the average length of calls will be more than 250 seconds? (06 Marks)

(Total Marks: 20 Marks)

03. (I). According to survey by Business Analyst, 56% of executives believe that employees are more productive. Suppose 200 executives are randomly surveyed.What is the probability that fewer than 51% of the executives believe employees are most productive? (03 Marks)

(II). A stationery store manager wants to estimate the mean retail value of greeting cards that it has in its inventory. A random sample of 36 greeting cards indicates an average value of 167 and a standard deviation of 30. Assuming data are normallydistributed. Set up a 95% confidence interval estimate of the mean value of all greeting cards in the store's inventory. (04 Marks)

(III) Suppose that in past years the average price per square foot for warehouse in Colombo city has been Rs.3228. A national real estate investor wants to determine whether that figure has changed now. The investors hires a researcher who randomly samples 19 warehouses that are for sale across the Colombo and finds that mean price per square foot is Rs.3167, with the standard deviation of Rs.176. If the researcher uses a 5% level of significance, what statistical conclusion can be

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reached? What are the hypotheses need to be formulated? **(06 Marks)**

(IV). It has been presumed that urban residents spend more money than rural residents for consumptions of food in Sri Lanka. In a preliminary experiment, 100 urban and rural residents were taken as sample. The average amount of money spent by both residents per day was given below.

Residents	Average money spend per day	Standard deviation
Urban	Rs.280	Rs.40
Rural	Rs.268	Rs.52

Based on the above data can we infer that average money spend for food by both residents are equal? Use 5% significance level to determine whether there is difference among urban and rural residents in spending money for food.

(07 Marks)

(Total Marks: 20 Marks)

04. (I). A specialist in hospital administration stated that the number of employees in a hospital can be estimated by counting the number of beds in the hospital (a common measure of hospital size). A health care business researcher surveyed 10 hospitals and obtained the following data.

Hospital	Number of Beds	Number of Employees
A	20	69
B	32	78
C	18	51
D	44	81
E	65	82
F	46	80
G	25	53
H	30	67
I	23	64
J	50	86

a. Find coefficient of correlation and interpret.
b. Find coefficient of determinant and interpret.
c. Develop a regression model in an attempt to predict number of employees of a hospital by the number of beds.
d. Using part (c) find the number of employees when hospital size defined the number beds of 100. **(15 Marks)**

(II). Five contesters participated in a super singer final contest which was organised by

Channel LMT. The performances of contesters were evaluated by two judges. A programme coordinator wants to find the relationship between the scores marked by the judges. The following table summarises the scores produced by the judges for each contester.

Contesters / Judge	A	B	C	D	E
Judge 1	85	80	95	70	90
Judge 2	75	89	82	86	78

Find rank correlation between the marks produced by the two judges and comments on the cohesiveness among the judges. **(05 Marks)**

(Total Marks: 20 Marks)

05. (I). Briefly explain the difference between the additive and multiplicative models with examples. **(03 Marks)**

(II). The following table gives the quarterly sales units of a small company over the last 4 years.

Year	Sales of Umbrella ('000 units)			
	Q 1	Q 2	Q 3	Q 4
2008	24.8	36.3	38.1	47.5
2009	31.2	42.0	43.4	55.9
2010	40.0	48.8	54.0	69.1
2011	54.7	57.8	60.3	68.9

You are required to:

a. calculate the trend for the sales of umbrella as a centred four-point moving average; **(06 Marks)**

b. evaluate the seasonal component for each quarters based on the moving average trend obtained in part (a), assuming the multiplicative model; **(04 Marks)**

c. and forecast the sales of umbrella for the four quarters of 2012 using trend forecasts of 66.7, 68.8, 70.9 and 73. **(02 Marks)**

(Total Marks: 15 Marks)

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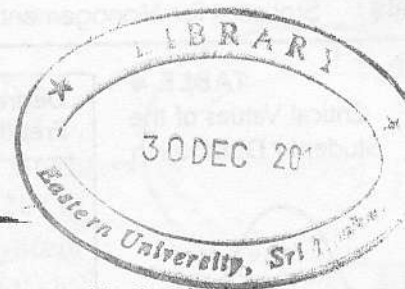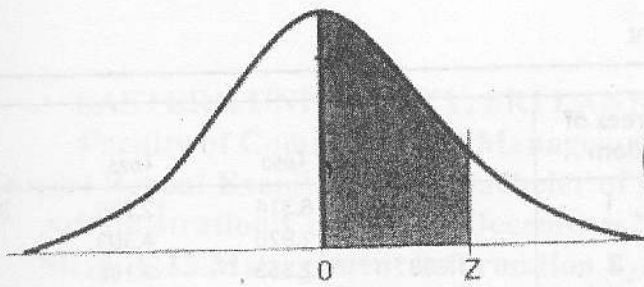
This table presents the area between the mean and the Z score . When Z=1.96, the shaded area is 0.4750.

Areas Under the Standard Normal Curve

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	.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	.2611	.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	.3830
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
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.6	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000									

TABLE 4
Critical Values of the Student t Distribution
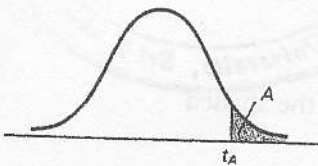
Degrees of Freedom	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
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
35	1.306	1.690	2.030	2.438	2.724
40	1.303	1.684	2.021	2.423	2.704
45	1.301	1.679	2.014	2.412	2.690
50	1.299	1.676	2.009	2.403	2.678
55	1.297	1.673	2.004	2.396	2.668
60	1.296	1.671	2.000	2.390	2.660
65	1.295	1.669	1.997	2.385	2.654
70	1.294	1.667	1.994	2.381	2.648
75	1.293	1.665	1.992	2.377	2.643
80	1.292	1.664	1.990	2.374	2.639
85	1.292	1.663	1.988	2.371	2.635
90	1.291	1.662	1.987	2.368	2.632
95	1.291	1.661	1.985	2.366	2.629
100	1.290	1.660	1.984	2.364	2.626
110	1.289	1.659	1.982	2.361	2.621
120	1.289	1.658	1.980	2.358	2.617
130	1.288	1.657	1.978	2.355	2.614
140	1.288	1.656	1.977	2.353	2.611
150	1.287	1.655	1.976	2.351	2.609
160	1.287	1.654	1.975	2.350	2.607
170	1.287	1.654	1.974	2.348	2.605
180	1.286	1.653	1.973	2.347	2.603
190	1.286	1.653	1.973	2.346	2.602
200	1.286	1.653	1.972	2.345	2.601
∞	1.282	1.645	1.960	2.326	2.576