EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
SECOND YEAR SECOND SEMESTER EXAMINATION IN
BACHELOR OF BUSINESS ADMINISTRATION/ BACHELOR OF COMMERCE
2010/2011 (MAY/ JUNE 2013)
(PROPER/ REPEAT/ RE-REPEAT)
COM 2053 BUSINESS STATISTICS

ver All Questions **Time: 03 Hours**

(I) (a) What is the difference between

1) a categorical variable and a numerical variable?
2) a discrete variable and a continuous variable?

(02 Marks)

(b) Each of the following variables, determine whether the variable is categorical or numerical. If the variable is numerical, determine whether the variable is discrete or continuous.

1) Amount of money spent on clothing in the past month.
2) Favorite soft drinks.
3) Number of pairs of shoes owned.

(03 Marks)

(II) (a) "Measures of central tendency, dispersion and skewness are complementary to each other in understanding the characteristics of a frequency distribution". Explain it clearly.

(05 Marks)

(b) The numbers of weekly sales of 25 telemarketers are listed below.

19	28	32	30	30	09	12	08	10	31
20	10	20	10	10	30	21	30	30	20
30	11	10	29	10					

1) Draw a stem-and-leaf display.
2) Construct a frequency distribution with 5 class intervals of equal width and with the lower limit of the first class interval as 8.
3) Construct the histogram for the frequency distribution constructed in part (2). What pattern of modality and skewness do you see?
4) Using histogram, find the values of mean and median. Explain how you got these figures without computation.
5) Draw an ogive.

(10 Marks)

(Total Marks 20)

02. (I) (a) An internet pharmacy advertises that it will deliver the products that customers pu within 3 to 6 days. The manager of the company wanted to be more precise advertising. Accordingly, the manager recorded the number of days it took to de customers. From the data the following probability distribution was developed.

Number of days (X)	0	1	2	3	4	5	6	7	8
Probability P(X=x)	0.00	0.00	0.01	0.04	0.28	0.42	0.21	0.02	0.02

1) What is the probability that a delivery will be late?
2) What is the probability that a delivery will be early?
3) Calculate the mean and standard deviation of the number of days took to the products purchased to customers.

(05

(II) (a) Distinguish between the binomial distribution and the Poisson distribution.

$\binom{n}{x} p^x (1-p)^{n-x}$ $\frac{e^{-\lambda} \lambda^x}{x!}$

(03

(b) Errors in a billing process often lead to customer dissatisfaction and ultimate bottom line profits. An article about a particular company indicates that 20% of t prepared by the company contained an error. If 10 bills are processed, what probability that:

1) 0 bills will contain an error?
2) 2 or more bills will contain an error?

What are the mean and standard deviation of number of bills containing an error?

(06

(c) A toll-free phone number is available from 9a.m. to 9 p.m. for the customers to r complaints about a product purchased from a company. Past history indicates t average 0.4 calls are received per minute.

1) What is the probability that exactly three phone calls will be received durir minute period?
2) What is the probability that at most two phone calls will be received durir minute period?

(03

(d) On average 2% of all persons who are given a breathalyzer test by the state polic the test. Suppose that 500 breathalyzer tests are given. What is the approx probability that at least 2 will pass the exam? Justify your answer.

(03

(III) The amount of time spent by Sri Lankan adults watching television per day is normally distributed with a mean of 6 hours and a standard deviation of 1.6 hours.

1) What is the probability that a randomly selected Sri Lankan adult watches television for more than 07 hours per day?
2) What is the probability that the average number of hours spent watching television by a random sample of five adults is more than 07 hours?

(05 Marks)

(Total Marks 25)

(a) An economist wants to analyze the relationship between income and expenditure on essential goods by households. He collects data from 10 households regarding their income and expenditure on essentials goods as given below.

Income (Rs. '000"s)	Expenditure on Essential Goods (Rs. '000"s)
25	12
70	9
48	11
34	9
18	8
60	18
21	9
22	8
53	19
44	10

1) Identify the independent and the dependent variables.
2) Calculate the coefficient of correlation and interpret its value based on the given problem.
3) Calculate the coefficient of determination and interpret its value based on the given problem.
4) Find the least squares regression model in an attempt to predict amount of expenditure on essential goods by amount of income and interpret its coefficients.
5) Using part (4) predict the portion of expenditure on essential goods spent when income is Rs. 75000.

(15 Marks)

(Total Marks 15)

(III)

04. (a) The following table gives quarterly demand for particular branded ice cream ov last 3 years.

Year	Demand ('000 Kgs)			
	Q 1	Q 2	Q 3	Q 4
2010	20	40	60	15
2011	30	48	78	22
2012	52	65	95	35

You are required to:

1) Calculate the trend for the demand of ice cream using centered fou moving average
2) Evaluate the seasonal component for each quarters based on the m average trend obtained in part (1), assuming the additive model.
3) Forecast the demand for the four quarters of 2013 using trend forecasts 70, 90 and 42.

(15 M

(Total Mar

05. (I) Explain the difference between the pair of terms given below:

1) Level of significance and level of confidence;
2) One tail test and two tail test;
3) Type I error and type II error.

(06 M

(II) A paper manufacturer has a production process that operates continuously throu an entire production shift. The paper is expected to have a mean length of 11 in and the standard deviation of the length is 0.02 inch. At periodic intervals, a sam selected to determine whether the mean paper length is still equal to 11 inch whether something has gone wrong in the production process to change the len the paper produced. A random sample of 100 sheets is selected, and the mean length is 10.998 inches.

1) Construct a 99% confidence interval estimate for the population mean length.
2) Interpret what the interval estimate tells you.
3) What do your results tell you about the paper length?

(07 M

(III) Two pizza restaurants A and B are located across the street from a campus. The restaurant A advertises that they deliver to the dormitories faster than the restaurant B. In order to determine whether this advertisement is valid, it is decided to order 10 pizzas from restaurant A and 10 pizzas from restaurant B, all at different times. The delivery times in minutes are given below.

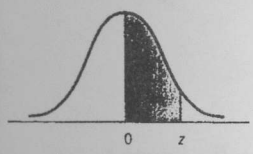
A	16.8	11.7	15.6	16.7	17.5	18.1	14.1	21.8	13.9	20.8
B	22.0	15.2	18/7	15.6	20.8	19.5	17.0	19.5	16.5	24.0

1) Assuming that the population variances are equal, at the 0.05 level of significance, is there evidence that the mean delivery time for the restaurant A is less than the mean delivery time for the restaurant B?
2) Assuming that the population variances are equal, construct and interpret 95% confidence interval for the difference between the mean delivery time of the restaurant A and the mean delivery time of the restaurant B

(12 Marks)

(Total 25 Marks)

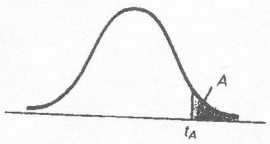
Table 3 Normal Probabilities



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	.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

SOURCE: Abridged from Table 1 of A. Hald, *Statistical Tables and Formulas* (New York: Wiley & Sons, Inc.), 1952. Reproduced by permission of A. Hald and the publisher, John Wiley & Sons, Inc.

Table 4 Critical Values of t



DEGREES OF FREEDOM	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$	DEGREES OF FREEDOM	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657	24	1.318	1.711	2.064	2.492	2.797
2	1.886	2.920	4.303	6.965	9.925	25	1.316	1.708	2.060	2.485	2.787
3	1.638	2.353	3.182	4.541	5.841	26	1.315	1.706	2.056	2.479	2.779
4	1.533	2.132	2.776	3.747	4.604	27	1.314	1.703	2.052	2.473	2.771
5	1.476	2.015	2.571	3.365	4.032	28	1.313	1.701	2.048	2.467	2.763
6	1.440	1.943	2.447	3.143	3.707	29	1.311	1.699	2.045	2.462	2.756
7	1.415	1.895	2.365	2.998	3.499	30	1.310	1.697	2.042	2.457	2.750
8	1.397	1.860	2.306	2.896	3.355	35	1.306	1.690	2.030	2.438	2.724
9	1.383	1.833	2.262	2.821	3.250	40	1.303	1.684	2.021	2.423	2.705
10	1.372	1.812	2.228	2.764	3.169	45	1.301	1.679	2.014	2.412	2.690
11	1.363	1.796	2.201	2.718	3.106	50	1.299	1.676	2.009	2.403	2.678
12	1.356	1.782	2.179	2.681	3.055	60	1.296	1.671	2.000	2.390	2.660
13	1.350	1.771	2.160	2.650	3.012	70	1.294	1.667	1.994	2.381	2.648
14	1.345	1.761	2.145	2.624	2.977	80	1.292	1.664	1.990	2.374	2.639
15	1.341	1.753	2.131	2.602	2.947	90	1.291	1.662	1.987	2.369	2.632
16	1.337	1.746	2.120	2.583	2.921	100	1.290	1.660	1.984	2.364	2.626
17	1.333	1.740	2.110	2.567	2.898	120	1.289	1.658	1.980	2.358	2.617
18	1.330	1.734	2.101	2.552	2.878	140	1.288	1.656	1.977	2.353	2.611
19	1.328	1.729	2.093	2.539	2.861	160	1.287	1.654	1.975	2.350	2.607
20	1.325	1.725	2.086	2.528	2.845	180	1.286	1.653	1.973	2.347	2.603
21	1.323	1.721	2.080	2.518	2.831	200	1.286	1.653	1.972	2.345	2.601
22	1.321	1.717	2.074	2.508	2.819	∞	1.282	1.645	1.960	2.326	2.576
23	1.319	1.714	2.069	2.500	2.807						

SOURCE: From M. Merrington, "Table of Percentage Points of the t-Distribution," *Biometrika* 32 (1941): 300. Reproduced by permission of the Biometrika Trustees.