

11 OCT 2014

**EASTERN UNIVERSITY, SRI LANKA**  
**FACULTY OF COMMERCE AND MANAGEMENT**  
**SECOND YEAR SECOND SEMESTER EXAMINATION IN**  
**BACHELOR OF BUSINESS ADMINISTRATION/ BACHELOR OF COMMERCE**  
**2011/2012 (August 2014)**  
**(PROPER/ REPEAT/ RE-REPEAT)**  
**COM 2053 BUSINESS STATISTICS**

Answer All Questions.  
Calculators permitted.

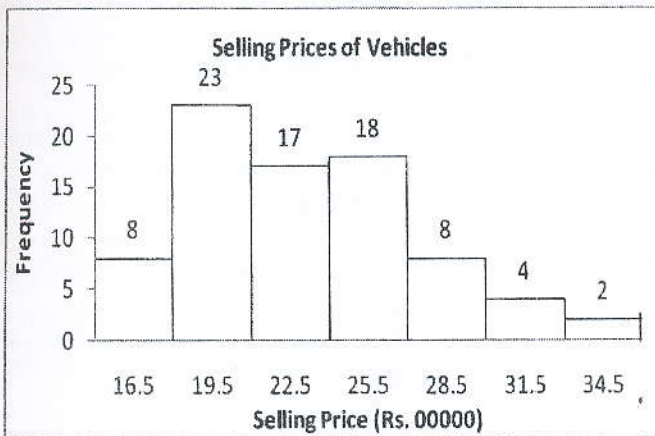
Time: 03 Hours.

(i) Distinguish the following pairs of terms by giving suitable examples:

- (a) Quantitative variable and qualitative variable
- (b) Time series data and cross sectional data

(06 Marks)

(ii) The following chart shows prices of the vehicles sold last month at Raja Autoplex.



- (a) What is this chart called?
- (b) What is the total number of vehicles sold at last month?
- (c) Construct a frequency table based on the chart.
- (d) Compute the mean and standard deviation based on the frequency table constructed by you.
- (e) What conclusions can you reach about the selling prices of the vehicles based on the information presented both in the chart and the frequency table and the computed measures mean and standard deviation?
- (f) Portray the selling prices as a frequency polygon.

(14 Marks)

(Total Marks 20)

02. (i) (a) Distinguish between a discrete random variable and a continuous random variable giving an example for each.

(b) How do you find a mean and standard deviation of a discrete random variable?

(c) How do you tell a random variable has a binomial distribution?

(ii) (a) A bank reports that 7 percent of its credit card holders will default at some time in the future. The bank mailed out 12 new cards recently.

1) What is the probability that none of the cardholders will default?

2) What is the probability that at least one will default?

3) How many of these new cardholders would you expect to default? What is the standard deviation?

(b) Shaver manufacturing industry offers dental insurance to its employees. A recent study shows that the human resource director shows the annual cost per employee followed the normal probability distribution with a mean of Rs. 12800 and a standard deviation of Rs. 4200.

1) What is the probability that a selected employee in the Shaver manufacturing industry cost more than Rs. 15000 per year for dental expenses?

2) What is the probability that a selected employee in the Shaver manufacturing industry between Rs. 12000 and Rs. 15000 per year for dental expenses?

3) What was the cost for the 10 percent of employees who incurred the highest dental expenses?

4) What are the median and modal dental expenses of the employees of the Shaver manufacturing industry?

(c) According to a survey on personal finances, 46% of workers in a country say that they will have enough money to live comfortably when they retire. If a random sample of 100 workers selected, what is the probability that between 45% and 55% workers in the sample say they will have enough money to live comfortably when they retire?

(Total Marks)

03. The director of the Roy Financial Services believes that there is a relationship between the number of client contacts and the Rupees amount of sales. To document this assertion, the director gathered the following sample information.

11 OCT 2014

Number of contacts (X)	Sales (Rs. thousands) (Y)
14	24
12	14
20	28
16	30
46	80
23	30
48	90
50	85
55	120
50	110

- 1) Plot a scatter diagram for the above data set.
- 2) Comment on the relationship between the number of contacts and the amount of sales based on the scatter diagram obtained
- 3) How strong is the relationship between the number of contacts and the amount of sales?
- 4) Calculate the coefficient of determination and interpret its value based on the given problem.
- 5) Estimate the least squares regression equation in an attempt to predict the amount of sales by the number of contacts and interpret its coefficients.
- 6) Determine the estimated sales if 40 contacts are made.

(18 Marks)

**(Total Marks 18)**

The following table gives quarterly demand for a particular branded ice cream over the last 3 years.

Year	Demand ('000 Kgs)			
	Q 1	Q 2	Q 3	Q 4
2011	20	40	60	15
2012	30	48	78	22
2013	52	65	95	35

- 1) Calculate the trend for the demand of ice cream using centered four-point moving average
- 2) Determine the seasonal index for each of the four quarters using the ratio to moving average method (assuming the multiplicative model).
- 3) Forecast the demand for the four quarters of 2014 using trend forecasts of 55, 70, 90 and 42.

(15 Marks)

(Total Marks 15)

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

- 1) Level of significance and level of confidence;
- 2) Type I error and type II error.

(03 Marks)

(ii) The following data represent the responses (Y yes and N for no) from a sample of 40 college students to the question "Do you currently own shares in any stocks?"

N N Y N N Y N Y N Y N N Y N Y Y N N N Y  
N Y N N N N Y N N Y Y N N N Y N N Y N N

- 1) Determine the sample proportion,  $p$ , of college students who owns shares of stocks?
- 2) Construct a 95% confidence interval estimate for the proportion of college students who own shares of stocks and interpret it.

(07 Marks)

(iii) The mean monthly sales of insurance agents in a large company is Rs.72, 000. In an attempt to improve sales, a new training program has been devised. Ten agents are randomly selected to participate in the program. At its completion, the sales of the agents in the next month are recorded as follows (in Rs. thousands):

63, 87, 95, 75, 83, 78, 69, 79, 103, 98

- 1) Identify the population, sample and variable under study.
- 2) Estimate the mean and standard deviation of monthly sales for those agents who have taken the new training program.
- 3) Do these data provide sufficient evidence at the 10% significance level to indicate that the program is successful?

(08 Marks)

(iv) The vice president for Nursing Services at Green Memorial Hospital recently noticed in the job postings for nurses that those are unionized seem to offer higher wages. The vice president decided to investigate and gathered the following information. Assuming the population variances are equal, at the 0.05 level of significance, would it be reasonable for vice president to conclude that union nurses earn more?

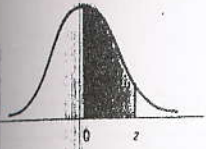
Group	Mean wage (in Rs. thousands)	Population standard deviation (in Rs. thousands)	Sample size
Union	20.75	2.25	40
Nonunion	19.80	1.90	45

(07 Marks)

(Total 25 Marks)

11 OCT 2014

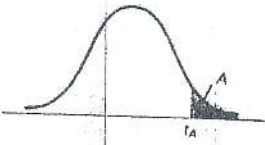
Normal Probabilities



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.

Critical Values of  $t$



DEGREES OF FREEDOM						DEGREES OF FREEDOM				
	$t_{.100}$	$t_{.090}$	$t_{.025}$	$t_{.010}$	$t_{.005}$		$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$
1	3.078	6.314	12.706	31.821	63.657	24	1.318	1.711	2.064	2.492
2	1.886	2.920	4.303	6.965	9.925	25	1.316	1.708	2.060	2.485
3	1.638	2.353	3.182	4.541	5.841	26	1.315	1.706	2.056	2.479
4	1.533	2.132	2.776	3.747	4.604	27	1.314	1.703	2.052	2.473
5	1.476	2.015	2.571	3.365	4.032	28	1.313	1.701	2.048	2.467
6	1.440	1.943	2.447	3.143	3.707	29	1.311	1.699	2.045	2.462
7	1.415	1.895	2.365	2.998	3.499	30	1.310	1.697	2.042	2.457
8	1.397	1.860	2.306	2.896	3.355	35	1.306	1.690	2.030	2.438
9	1.383	1.833	2.262	2.821	3.250	40	1.303	1.684	2.021	2.423
10	1.372	1.812	2.228	2.764	3.169	45	1.301	1.679	2.014	2.412
11	1.363	1.796	2.201	2.718	3.106	50	1.299	1.676	2.009	2.403
12	1.356	1.782	2.179	2.681	3.055	60	1.296	1.671	2.000	2.390
13	1.350	1.771	2.160	2.650	3.012	70	1.294	1.667	1.994	2.381
14	1.345	1.761	2.145	2.624	2.977	80	1.292	1.664	1.990	2.374
15	1.341	1.753	2.131	2.602	2.947	90	1.291	1.662	1.987	2.369
16	1.337	1.746	2.120	2.583	2.921	100	1.290	1.660	1.984	2.364
17	1.333	1.740	2.110	2.567	2.898	120	1.289	1.658	1.980	2.358
18	1.330	1.734	2.101	2.552	2.878	140	1.288	1.656	1.977	2.353
19	1.328	1.729	2.093	2.539	2.861	160	1.287	1.654	1.975	2.350
20	1.325	1.725	2.086	2.528	2.845	180	1.286	1.653	1.973	2.347
21	1.323	1.721	2.080	2.518	2.831	200	1.286	1.653	1.972	2.345
22	1.321	1.717	2.074	2.508	2.819	$\infty$	1.282	1.645	1.960	2.328
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.