

EASTERN UNIVERSITY, SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT
SECOND YEAR SECOND SEMESTER EXAMINATION IN
BACHELOR OF BUSINESS ADMINISTRATION/ BACHELOR OF COMMERCE
2012/2013 (August 2015)
(PROPER/ REPEAT/ RE-REPEAT)
COM 2053 BUSINESS STATISTICS.

All Questions.
Calculators permitted.

Time: 03 Hours

- a. What are the features of a good graph in data presentation?
- b. What are the facts to be considered when constructing a graph to present data?
- c. When is it not appropriate to use a graph for data presentation?

(08 Marks)

The following table shows the literacy rate (in percentage) and life expectancy (in years) of the selected Asian countries.

	Sri Lanka	India	Pakistan	Malaysia	Thailand	Bangladesh
Literacy Rate (%)	91.2	62.8	54.9	93.1	93.5	56.8
Life Expectancy (Years)	75.1	65.8	65.7	74.5	74.3	69.2

- a. Identify the quantitative and the qualitative variables.
- b. Identify each of variables as nominal, ordinal, interval or ratio. Justify your answer.
- c. Draw a clustered bar chart to present the information given in the table.
- d. What conclusions can you reach about the association between the literacy rate and the life expectancy of the selected Asian countries based on the information presented both in the chart and in the table?

(10 Marks)

(Total Marks 18)

In the past, completion times for a certain job task in the offices at Harmon Electronics have shown the following statistics in hours: a mean of 12.2, a median of 13.2 and a mode of 14.5. The variance was 8.21. The data shown in the table given below have been recently collected to evaluate the changes in employee efficiency.

Hours in Completion	Number of times the Task took this long(Frequency)
5 and under 7	4
7 and under 9	8
9 and under 11	12
11 and under 12	8
13 and under 15	5
15 and under 17	2

- Construct an appropriate graph to show the distribution of recent completion time.
- Comment on the distribution of recent completion time based on the graph.
- Compute and interpret the following measures for the recent completion time :
 - Mean
 - Median
 - Mode
 - Standard deviation
- What conclusion do you make about the employees' efficiency?

(12 M)

- Distinguish a binomial distribution and a Poisson distribution by giving a business example for each.
 - A trucking company finds that 30 percent of its shipments arrive late. If eight shipments are scheduled:
 - What is the probability that three or more will arrive late?
 - How many would you expect to arrive late?
 - A manufacturing process produces 1.2 defects per 100 units of output. What is the probability that the process produces exactly four defects in the next 500 units of output?

(10 M)

(Total Mark)

- Define the term "Normal probability distribution".
 - State the central limit theorem.
 - Mattel Corporation produces AA size batteries. The distribution of lifetimes of these batteries closely follows the normal distribution with a mean of 35 hours and a standard deviation of 5.5 hours.
 - What is the probability that the lifetime of a battery is between 32 hours and 37 hours?
 - If a random sample of three batteries is selected:
 - What can you say about the shape of the distribution of the sample mean?
 - What is standard error of the distribution of the sample mean?
 - What is the probability that the mean lifetime is greater than 36 hours?

(10 M)

- Distinguish the following pair of terms:
 - Null hypothesis, Alternative hypothesis;
 - One tail test, Two tail test;
 - Point estimate, Confidence interval estimate.

(06 M)

- b. In a time study in the banking industry, 30 randomly selected managers spent a mean of 2.4 hours each day on paper work with a standard deviation of 1.3 hours. Construct a 95% confidence interval for the mean paperwork time of all the managers and interpret it. (04 Marks)
- c. A courier services advertises that its average delivery time is less than 6 hours for local deliveries. A random sample times for 12 deliveries to an address across town was recorded. These data are shown below.

3.03	6.33	6.50	5.22	3.56	6.76
7.98	4.82	7.96	4.54	5.09	6.46

- i) State the appropriate null and alternative hypothesis to test the courier's claim at 1% level of significance.
- ii) What is the test statistic? Compute it for the given information.
- iii) What is the critical value for the test?
- iv) Formulate the decision criteria for the test.
- v) Write the statistical decision of the test.
- vi) Write your conclusion about the courier's claim.

(08 Marks)

(Total 28 Marks)

A random sample of eight drivers insured with a company and having similar auto insurance policies was selected to explore whether there is any relationship between driving experience and monthly auto insurance premium. The following table lists their driving experiences (in years) and monthly auto insurance premiums.

Driving Experience (in years)	Monthly Auto Insurance Premium (in Rs 100)
5	64
2	87
12	50
9	71
15	44
6	56
25	42
16	60

- a. Draw an appropriate diagram for the above data set to identify whether there is any relationship between driving experience and monthly auto insurance premium.
- b. Comment on the relationship between the driving experience and the monthly auto insurance premium based on the diagram obtained.
- c. Compute an appropriate statistic to measure the strength of the relationship between the driving experience and the monthly auto insurance premium. Interpret the statistic computed.
- d. Calculate the coefficient of determination and interpret its value based on the given problem.

- e. Estimate the least squares regression equation in an attempt to predict the monthly insurance premium by the years of driving experience and interpret its coefficients.
- f. Sketch the regression line on the diagram obtained in part (1).
- g. Predict the monthly auto insurance premium for a driver with 10 years of driving experience.

(18 Marks)

(Total Marks)

05.

Deleven International manufactures and sells toys all around the world. Management accountant of the company wishes to determine seasonal indexes for the quarterly data revenue. The following table shows the quarterly sales for Deleven International for the years 2012 through 2014. The sales are reported in millions of rupees.

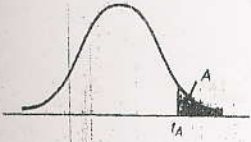
Year	Quarter	Sales
2012	1	7.0
	2	5.5
	3	10.8
	4	15.0
2013	1	7.1
	2	5.7
	3	11.1
	4	14.5
2014	1	8.0
	2	6.2
	3	11.4
	4	14.9

- a. Determine a quarterly seasonal index using the ratio-to-moving-average method.
- b. The estimated sales trend line is given by $\hat{Y}_t = 7.4885 + 0.3510t$, where $t=1$ denotes the first quarter of 2012.
- Forecast the sales for the first three quarters of 2015 incorporating the seasonal index.
 - If the cyclical index is 0.95, what would be the forecasted sales for the fourth quarter of 2015?

(14 Marks)

(Total Marks)

Critical Values of t



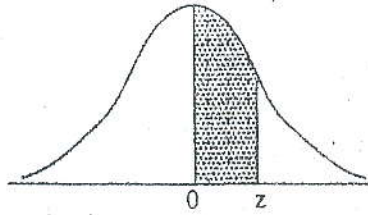
DEGREES OF FREEDOM	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$	DEGREES OF FREEDOM	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657	24	1.318	1.711	2.064	2.492	2.797
2	1.886	2.920	4.303	6.965	9.925	25	1.316	1.708	2.060	2.485	2.787
3	1.638	2.353	3.182	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.

TABLE

Area Under Normal Curve

$$z = \frac{x - \bar{x}}{\sigma}$$



Z	0	1	2	3	4	5	6	7	8
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190
0.6	0.2258	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2518
0.7	0.2580	0.2612	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823
0.8	0.2881	0.2910	0.2939	0.2967	0.2996	0.3023	0.3051	0.3078	0.3106
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990