



EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

THIRD EXAMINATION IN SCIENCE 2013/2014

SECOND SEMESTER (June, 2016)

MT 308 - STATISTICS

(Special Repeat)

Answer all questions

Time : Two hours

Calculator and Statistical tables will be provided

- a) Show that Spearman's rank correlation coefficient r_s is given by

$$r_s = 1 - \frac{6 \sum_{i=1}^n d_i^2}{n(n^2 - 1)}$$

where n is the number of observations and d_i is the difference between ranks assigned to the i^{th} individuals.

- b) Find the rank correlation coefficient between the midterm marks and the IQ ranking of a random sample of 10 students in a large class.

Students	1	2	3	4	5	6	7	8	9	10
Midterm Marks	77	78	65	84	85	88	67	92	68	96
IQ Ranking	7	6	8	5	4	3	9	1	10	2

2. (a) Comment on the symmetry of the distribution of the data given below with the help of a box plot:

17, 22, 18, 33, 14, 36, 39, 41, 25, 31, 18, 19, 16, 21, 21.

- (b) Two cricketers scored the following runs in the several innings.

A	42	17	83	59	72	76	64	45	40	32
B	28	70	31	0	59	108	82	14	3	95

- Find who is a better run getter?
 - Who is the more consistent batsman?
- (c) In a certain distribution the following results were obtained:

Mean = 45, Median = 48, Coefficient of skewness = 0.4.

From the above data find the value the standard deviation.

3. (a) In order to estimate the mean length of leaves from a certain tree a sample of 100 leaves was chosen and their lengths measured correct to the nearest centimeter. A grouped frequency table was set up and the results were as follows:

Mid interval value(cm)	2.2	2.7	3.2	3.7	4.2	4.7	5.2	5.7	6.2
Frequency	3	5	8	12	18	24	20	8	2

- Find the boundary value of each of the mid interval value.
 - Draw the histogram and frequency polygon curve for the above data.
 - Calculate mean, median, mode and standard deviation.
 - Comment on the shape of the distribution.
- (b) The daily expenditure of 100 families is given below.

Expenditure	0-20	20-40	40-60	60-80	80-100
Number of Families	13	?	27	?	16

If the mode of the distribution is 44,

- find the missing number of families in 20 – 40 and 60 – 80.
- calculate the Karl-Pearson's coefficient of skewness.

A farmer wants to find the relationship between the amount of fertilizer used and the yield of corn. He selected several acres of his land on which he used different amount of fertilizer to grow corn. The following table gives the amount of fertilizer (in pounds) used and the yield of corn (in pounds) for each of the seven acres.

Amount of fertilizer	Yield of corn
120	138
80	112
100	129
70	96
88	119
75	104
110	134

- Draw a scatter diagram for those data. Does the scatter diagram show a linear relationship between fertilizer used and yield of corn?
- Fit the estimated regression line, giving the estimated model for the data.
- Give a brief interpretation of the estimated slope calculated in part (b).
- Test at 5% significance level if the true slope is different from zero.
- Compute the coefficient of determination and interpret it.
- Find a 95% confidence interval for the true slope.
- What is the estimated value of the yield of corn if the farmer used 125 pounds of fertilizer to grow?