EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

THIRD EXAMINATION IN SCIENCE 2013/2014

SECOND SEMESTER (Oct., 2017)

AM 308 - STATISTICS

(Special Repeat)

Answer all questions   Time : Two hours

Calculator and Statistical tables will be provided

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1. (a) In a moderately asymmetrical distribution the values of mode and mean are
        32.1 and 35.4 respectively. Find the median value.

    (b) 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

    i. Find the boundary value of each of the mid interval value.

    ii. Draw the histogram and frequency polygon curve for the above data.

    iii. Locate the modal value graphically for the above distribution.

    iv. Calculate mean, median, mode and standard deviation.

    v. Comment on the shape of the distribution.

(c) A train runs 25 miles at a speed of 30 miles per hour, another 50 miles at a speed of 40 miles per hour, then due to repairs of the track travels for 6 minutes at a speed of 10 miles per hour and finally covers the remaining distance of 24 miles at a speed of 24 miles per hour. What is the average speed in miles per hour?

2. (a) The daily expenditure of 170 families is given below:

Expenditure	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of families	10	20	?	40	?	25	15

If the median of the distribution is 35,

   i. find the missing number of families of the distribution;

   ii. calculate the arithmetic mean of the distribution.

(b) The mean annual salaries paid to 1000 employees of a company was Rs. 5000. The mean annual salaries paid to male and female employees were Rs.5200 and Rs.4200 respectively. Determine the percentage of male and female employees.

(c) Particulars regarding lifetime of two brands of light bulbs are given below:

	Brand I(hour)	Brand II(hour)
Mean	800	770
Standard deviation	100	60

Which brand has greater variability in lifetime and which Brand of light bulb is stable lifetime?

(d) For a group of 200 candidates, the mean and the standard deviation of scores were found to be 40 and 15 respectively. Later it was discovered that the scores 43 and 35 were misread as 34 and 53 respectively. Find the corrected mean and standard deviation corresponding to the corrected figures.

3. (a) Prove the Spearman's rank correlation coefficient r_s is given by

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

where d_i is the difference between ranks assigned to the ith individual and n is the number of observations.

(b) Find the maximum and minimum values of the Spearman's rank correlation coefficient.

(c) Find the rank correlation coefficient between the IQ of a person and the number of hours spent in front of TV per week.

IQ	106	86	100	101	99	103	97	113	112	110
Hours spent in front of TV	7	0	27	50	28	29	20	12	6	17

4. The following table presents sample data relating the number of study hours spent by students outside of class during a three week period for a course in statistics and their scores in an examination given at the end of that period.

Sampled student	1	2	3	4	5	6	7	8
Study hours	20	16	34	23	27	32	18	22
Examination grade	64	61	84	70	88	92	72	77

(a) What kind of relationship do you expect between study hours and examination grade?

(b) Determine the least square linear regression line and interpret those coefficients.

(c) Calculate the standard error of above estimate.

(d) Test $H_0 : \beta = 0$ against $H_1 : \beta \neq 0$ at 1% significant level.

(e) Construct a 90% confidence interval for estimating the mean exam grade for students who devote 30 hours to course preparation.

(f) Estimate the examination grade of a student who devote 30 hours of study to the course preparation.