EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

SPECIAL REPEAT EXAMINATION IN SCIENCE - 2007/2008

THIRD YEAR FIRST AND SECOND SEMESTER (Feb., 2010)

MT 308 - STATISTICS

Answer all questions   Time: Two hours

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1. (a) Derive the equation that is used to calculate the Spearman's rank correlation coefficient.

(b) Fourteen singers in a music competition were ranked by two judges as follows:

Singers	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Judge I	13	4	5	11	2	6	8	9	12	1	3	7	10	14
Judge II	10	9	7	8	1	3	6	14	11	2	4	5	12	13

Using the method of rank correlation find whether the ranks given by the two judges have concordance.

2. Following data have been collected on experience of operators (in years) and their performance rating.

Operator	A	B	C	D	E	F	G	H
Experience	16	12	18	4	3	10	5	12
Rating	87	88	89	68	78	80	75	83

(a) Construct a scatter diagram for these data. Does the scatter diagram show a linear relationship between experience and performance rating?

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(b) Estimate the least squares regression line of rating performance on experience.

(c) Fit the estimated line on the scatter plot.

(d) Interpret the regression coefficient in the context of the problem.

(e) Test whether the regression coefficient, β_1 is different from zero at 5% significance level.

(f) Compute the coefficient of determination and interpret it.

(g) Construct 95% confidence interval for the slope and interpret it.

(h) What is the estimated value of the performance rating when the operator's experience is 14 years?

3. (a) After change of origin and scale, a frequency distribution of a continuous variable takes the form as under:

Step Deviation (u)	-3	-2	-1	0	1	2	3
Frequency (f)	10	15	25	25	10	10	5

If the mean and variance of the distribution are 31 and 15.9 respectively find the original frequency distribution.

(b) An analysis of daily wages of workers of two organizations A and B yielded the following results.

	Organization A	Organization B
Number of workers	10	20
Average daily wages	Rs.30	Rs.15
variance	25	100

Find the average daily wage and the standard deviation of wages of all workers in the two organizations taken together.

(c) If 20 is subtracted from every observation in a data set, then the coefficient of variation of the resulting data set is 20%. If 40 is added to every observation of the same data set, then the coefficient of variation of the resulting set of data is 10%. Find the mean and standard deviation of the original set of data.

4. (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 cm. 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 values of each of the mid interval value.

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

  iii. Calculate mean, median, mode, standard deviation and Karl Pearson's coefficient of skewness.

  iv. Comment on the shape of the distribution.

(b) The arithmetic mean and standard deviation of monthly profits of two companies X and Y for a year are given below:

	X	Y
Mean	100	90
Standard deviation	25	18

Comment on the consistency of these companies with respect to their profit.