

Eastern University, Sri Lanka
Second Year First Semester Examination in Agriculture 2002/2003
CSC 2101 Introductory Statistics

Answer All Questions

Time Allowed: Two Hours

1. (i) Explain the following terms
- Correlation
 - Correlation coefficient

(ii) Air with varying concentrations of CO₂ is passed over wheat leaves at a temperature of 35°C and the uptake of CO₂ by the leaves is measured. Results for eleven leaves at different concentrations (x) of uptake (y) are obtained and are as follows:

Concentration	Uptake
(Cm ³ /dm ² /hour)	
75	0.00
100	0.65
100	0.50
120	1.00
130	0.95
130	1.30
160	1.80
190	2.80
200	2.50
240	4.30
250	4.50

$$\sum x = 1695$$

$$\sum y = 20.30$$

$$\sum xy = 4004.5$$

$$\sum x^2 = 295625$$

$$\sum y^2 = 60.335$$

- Plot a scatter diagram to the above data.
- Calculate the regression line of y and x and enter on the graph
- Calculate the correlation coefficient and test its significance.
- Estimate the uptake of CO₂ at concentration 150
- If the uptake is around 2.0 Cm³/dm²/hour, what would be the concentration of CO₂ in the air.

P.T.O

2 The gains in weight (lb) of 40 pigs during a 20-day period and written in random order were:

33	32	39	17
53	31	34	22
34	11	33	20
29	30	33	19
39	19	33	53
57	24	39	21
12	53	36	53
24	44	32	25
39	19	32	40
36	30	30	21

- Construct a histogram to demonstrate the distribution of these weight gains. (Use six class frequencies)
 - Calculate the mean, variance and standard deviation of the distribution.
 - Calculate the mean for each of the four columns of data. Calculate the mean, variance and standard deviation of these four means. Compare them with the values to be expected from the mean, variance and standard deviation of the individual values.
3. (i) Write notes on the following:
- Chi-square test
 - Law of product probability
 - Limitations of chi-square test
- (ii) The results of phenotypic analysis of 96 F_2 progeny in two replicate experiments is shown below:

Experiment	Phenotype-1	Phenotype-2
1	70	26
2	76	20

Calculate chi-square for each experiment assuming a (a) 3:1 ratio, (b) 13:3 ratio, (c) Which hypothesis is most consistent with the data?

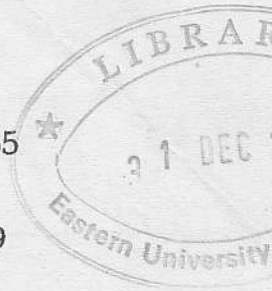
4. A researcher wishes to layout a co-ordinated Rice varietal trial with five new varieties along with a standard variety 94-1 in the field in a Randomized Complete Block Design. (RCBD).

The yield (mt/ha) obtained for each treatment is given below:

Variety	Yield in Mt/ha			
A	3.0	2.5	2.6	3.0
B	6.0	6.5	7.0	6.0
C	5.0	5.25	5.5	6.0
D	4.0	3.5	3.0	4.5
E	7.0	7.5	7.0	6.5
Standard	3.0	3.1	2.9	3.0

$$\sum x = 113.35$$

$$\sum x^2 = 603.9$$



Use the above information to answer the questions below:

- (i) How many replicates were used in this study?
- (ii) Does this conform to the expected number of replicates?
Explain your answer.
- (iii) Why the treatments were replicated in this experiment?
- (iv) Draw a field design to show how treatments are assigned.
- (v) Why did he arrange the treatments in a randomized manner?
- (vi) Is there any significant difference in yield among the varieties?
(Show your calculations and analysis)
- (vii) State with reasons the variety/ varieties that produced significantly higher yields than the standard variety, Bg 94-1.