



Eastern University, Sri Lanka

Fourth Year First Semester Examination in Agriculture 2003/2004

CSC 4101 Experimental Techniques in Agriculture

Answer All Questions

Time Allowed: Two Hours

1. A digestion trial was conducted to evaluate dry matter digestibility of 4 rations for cattle. Four animals were used for the study with each animal assigned to each ration in a different time period in a Latin Square Design. The letters in the table correspond to the ration and the number is the dry matter digestion coefficient.

Period	Animal			
	1	2	3	4
I	76 B	66 D	67 A	64 C
II	64 D	70 C	71 B	64 A
III	72 A	73 B	66 C	63 D
IV	68 C	70 A	62 D	66 B

- a. Complete the ANOVA, testing the hypothesis of no difference among rations.
- b. Use the DMRT to determine which ration means are significantly different.
2. a. Draw a scatter diagram of about 10 points to illustrate the following degrees of linear relationship:
- Perfect positive correlation
 - Weak negative correlation
 - Approximately zero correlation

- b. The following table indicates ANOVA for fitting a linear regression line of 6 cattle of their weight gains with levels of vitamin added to diet.

Source of variation	s.s.	d.f.	m.s.	F value
Regression	78.23	1	78.23	40.30
Residual	7.77	4	1.94	
Total	86.00			

Answer the following;

- If $S_{xx} = 17.5$, calculate the value for regression coefficient.
- If $\sum x = 21$, $\sum y = 72$, predict the straight line model.
- Calculate the Coefficient of correlation and comment on the relationship.
- Comment on the results of ANOVA.

3. The data below are from an experiment with carrots to investigate the effect of sowing rate on yield two stocks of seed. The experiment consisted of 3 randomized blocks of the 8 treatment combinations.

		Yield (MT/ha)		
Stock	Sowing rate (kg/ha)	I	Block II	III
S_1	1.5	4.20	4.94	4.45
	2.0	4.36	3.50	4.17
	2.5	5.40	4.55	5.75
	3.0	5.15	4.40	3.90
S_2	1.5	2.82	3.14	3.80
	2.0	3.74	4.43	2.92
	2.5	4.82	3.90	4.50
	3.0	4.57	5.32	4.35

$$\sum x = 103.08 \quad \sum x^2 = 455.71$$

- Calculate the analysis of variance, examining the effects of stock and sowing rate and interaction between these two factors.
- Summarize the data in a table of means and report your conclusions.

Contd.....



4. a. Briefly discuss the empirical detection of the failure of assumptions of ANOVA and selection of appropriate transformations.

b. Critically comment on the following statements.

- i. Factorial experiments are preferred to separate single factor experiments.
- ii. Covariance analysis is useful as a supplementary procedure to take care of sources of variation that cannot be accounted by Blocking.
