

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
200 level 1st Semester Examination – June/July 2017
SCT 211-2 Statistical Methods



Part C : Essay Questions (40 mark)

1. A psychologist is interested in his new learning programme. Ten (10) Subjects learn a list of words. Learning performance is measured using a recall test. After the first test all subjects are instructed how to use the learning programme and then learn a second list of words. Learning performance is again measured with the recall test. In the following table the number of correct remembered words are listed for both tests.

Subject	Score Before Programme	Score After Programme
1	24	26
2	17	24
3	32	31
4	14	17
5	16	17
6	22	25
7	26	25
8	19	24
9	19	22
10	22	23

- a) Construct the 95% confidence interval for true mean difference between the score before the programme and the score after the programme.

(8 mark)

b) Write down relevant hypothesis to test on the claim of "There is no significance difference between the score before the program and the score after the program".

(4 mark)

c) Test the above mentioned hypothesis at $\alpha = 0.05$ and interpret the results.

(8 mark)

2. Nutritionist is interested in comparing the effect of three diets on weight gain in piglets. In order to perform the experiment, the researcher chooses 10 litters, each with at least three healthy and similarly sized piglets that have just been weaned. In each litter, three piglets are selected and one treatment is randomly assigned to each piglet. Diets are labeled A, B and C. Piglet diet experiment with three litters is as follows.

Litter	Diet		
	A	B	C
1	54.3	53.1	59.7
2	53.6	52.4	59.7
3	55.2	57.1	67.2

a) Write down relevant hypothesis to test whether

i. there is any effect from the diets on weight gain.

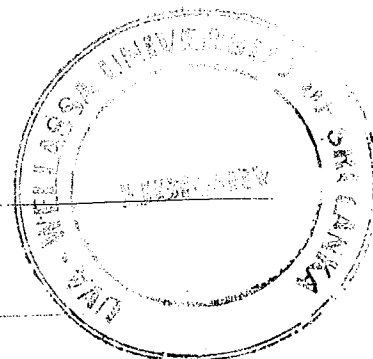
(4 mark)

ii. there is any effect from litter.

(4 mark)

b) Construct the appropriate ANOVA table and test the 2 hypothesis stated above.

(12 mark)



USEFUL FORMULA

$$\bar{x} = \frac{\sum x_i}{n}$$

$$S.D. = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

$$r = \frac{n(\sum x_i y_i) - (\sum x_i)(\sum y_i)}{\sqrt{[n \sum x_i^2 - (\sum x_i)^2][n \sum y_i^2 - (\sum y_i)^2]}}$$

$$S_{xx} = \sum x_i^2 - n\bar{x}^2$$

$$S_{yy} = \sum y_i^2 - n\bar{y}^2$$

$$S_{xy} = \sum x_i y_i - n\bar{x}\bar{y}$$

$$\hat{\beta}_0 = \bar{Y} - \hat{\beta}_1 \bar{X}$$

$$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}}$$

$$SSR = \hat{\beta}_1^2 S_{xx}$$

$$SST = S_{yy}$$

$$C.F. = \frac{Y_{..}}{tr}$$

$$SS_{Total} = \sum Y_{ij}^2 - C.F.$$

$$SS_{Treatment} = \frac{\sum Y_{i.}^2}{r} - C.F.$$

$$SS_{Block} = \frac{\sum Y_{.j}^2}{t} - C.F.$$