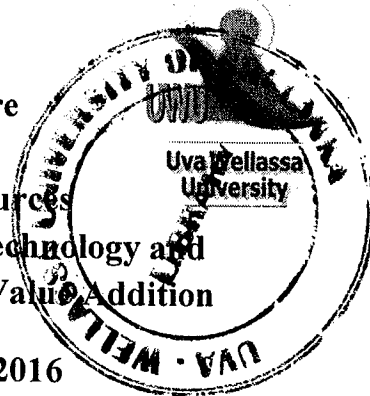


Uva Wellassa University
Faculty of Animal Science & Export Agriculture

Bachelor of Animal Science/ B.Sc. in Aquatic Resources
Technology/ B.Sc. in Export Agriculture / B.Sc. in Tea Technology and
Value Addition / B.Sc. in Palm & Latex Technology and Value Addition

End Semester Examination January/February 2016
Year III Semester I

Applied Statistics for Agriculture (EAG 301-3)



Instructions

Answer All questions

No. of questions : Five (05)

No. of pages : Four (04)

Total marks allocated : 100%

Time : Three (03) Hours

Students are allowed to use calculators.

Question 1

In a swine population susceptibility to a disease is genetically determine at a single locus. This gene has two alleles; B and b. The disease is associated with the recessive allele b; animals with the genotype bb will have the disease, while animals with Bb are only carriers. The frequency of the b allele is equal to 0.5. If a boar and sow both with Bb genotypes are mated and produce a litter of 10 piglets:

- 1.1 How many piglets are expected to have the disease? (4 Marks)
- 1.2 What is the probability that none of the piglets has the disease? (4 Marks)
- 1.3 What is the probability that at least one piglet has the disease? (4 Marks)
- 1.4 What is the probability that exactly a half of the litter has the disease? (4 Marks)
- 1.5 In another litter of 50 piglets, 8 are seen to have the disease. Find the probability that 10 or more piglets will have the disease. (4 Marks)

Question 2

2.1 Explain the meaning of the following terms used in hypothesis tests.

- a) Type I error. (2 Marks)
- b) Level of significance. (2 Marks)
- c) Power of the test. (2 Marks)

2.2 From a field of improved paddy variety, a sample of 36 plants was selected at random and the panicle length of each plant was measured. The mean of these measurements were 18.7 cm and population standard is 1.25 cm. The average panicle length of original variety is known as 19 cm.

- a) Construct the 95% confidence interval for the mean panicle length of original variety. (6 Marks)
- b) Test whether the improved variety is significantly different from the original with respect to panicle length. (7 Marks)

Question 3

An experiment on the effect of immunization of goats against disease was conducted at a farm. Two batches, each of 10 animals, were taken. One batch was inoculated and other batch was not inoculated. Then, both the batches were exposed to the infection of the disease. The frequencies of dead and survived animals were observed in both of the batches. The results are given in the table below. From the results, test whether the inoculation is effective against disease.

Table 01: The frequencies of dead and survived animals

	Dead	Survived	Total
Inoculation	2	8	10
Not inoculation	7	3	10
Total	9	11	20

(10 Marks)

Question 4

An experiment to evaluate the effects of certain variables on soil erosion was performed on 10-foot-square plots of sloped tea land subjected to 2 inches of artificial rain applied over a 20-minute period. It has recorded the Soil Lost (in pounds/acre), Slope Gradient of the plot, Length (in inches) of the largest opening of bare soil on any boundary and percentage of ground cover. The ANOVA table and the results of Regression analysis are as follows.

Table 01: Parameters Estimated

Predictor	Coefficient	SE coefficient	T	P
Constant	-1.88	18.13	-0.10	0.020
SG	77.33	44.51	1.74	0.006
LOBS	1.55	0.73	2.12	0.121
PGC	-23.90	13.43	-1.78	0.000

SG- Slope Gradient of the plot

LOBS- Length (in inches) of the largest opening of bare soil on any boundary

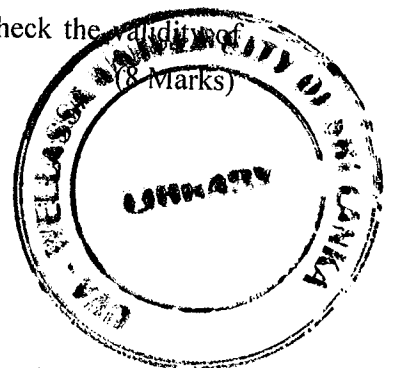
PGC- Percentage of ground cover

- 4.1 Write down the fitted model using the original terms. (4 Marks)
- 4.2 Complete the ANOVA Table given in below. (6 Marks)

Table 02: Analysis of Variance (ANOVA)

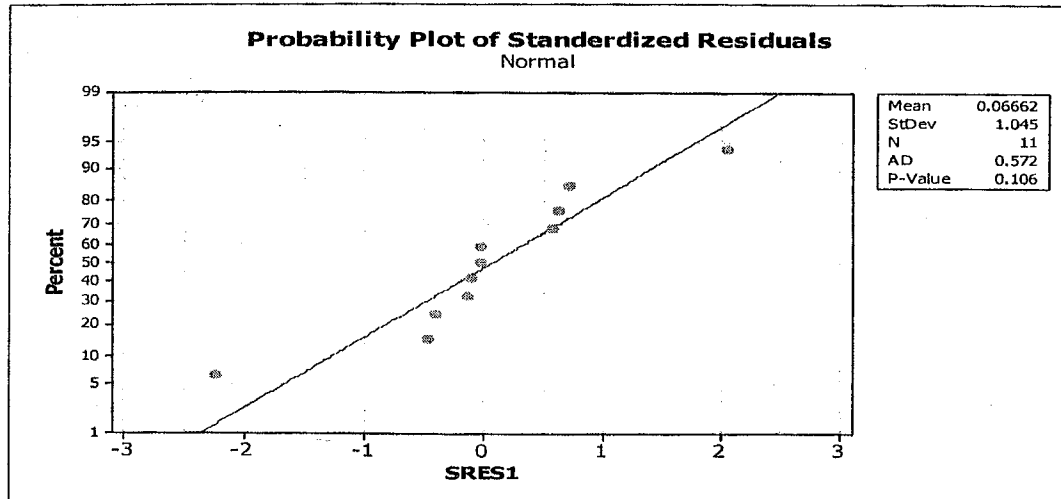
Source	DF	Sum of Square Error	Mean Square Error	F value
Regression				
Residual			2.30	
Total		696.59		

- 4.3 Comment on the significance of the fitted model at 0.05 level of significance (4 Marks)
- 4.4 Compute value of R^2 . (3 Marks)
- 4.5 What are the model assumptions and mention appropriate tests to check the validity of assumptions? (8 Marks)



4.6 The normal probability plot of standardized residuals of above analysis is given below.
What comments can you make using Graph 01? (4 Marks)

Graph 01: Probability Plot of Standardized Residuals



Question 5

Performance of four (4) food rations on body weight gain of a cattle breed was investigated. Four farms were used in the experiment and four bulls of four different age groups were used at each farm. Note that age groups were same in all four farms and there were total of sixteen bulls used in the experiment.

- 5.1 Identify the most suitable experimental design for this experiment giving justifications. (4 Marks)
- 5.2 Prepare the lay-out of the experimental design you proposed above elaborating your randomization procedure. (4 Marks)
- 5.3 What is the model that you will use? (4 Marks)
- 5.4 Construct the partial ANOVA giving sources of variations and degrees of freedom only. (6 Marks)
- 5.5 What are the advantages and disadvantages of the experimental design you proposed? (4 Marks)