THE OPEN UNIVERSITY OF SRI LANKA
B.Sc/B.Ed DEGREE/CONTINUING EDUCATION PROGRAMME,
BACHELOR OF INDUSTRIAL STUDIES PROGRAMME
APPLIED MATHEMATICS – LEVEL 03
PSU 1182/PSE 3182/PSZ 3182 – BIO STATISTICS
CLOSED BOOK TEST 2008/2009

DURATION: ONE AND HALF-HOURS

Date:28.10.2008 Time: 4.00pm -5.30pm

Non-programmable calculators are permitted.

ANSWER **ALL** QUESTIONS.

1. A researcher is interested in finding out whether washing the sesame seeds from an acidic solution and drying in the sun for over five hours improves the tendency of seeds to germinate. Past data indicate that this particular variety of seeds normally has about 60% germination rate. The researcher selected 450 seeds and put five seeds each into 90 pots after washing as described. The numbers of seeds germinated in the 90 pots are presented below.

5	5	5	4	3	2	1	4	4	1
5	5	4	5	4	5	5	2	5	3
5	3	5	3	5	3	5	5	5	5
4	5	4	5	4	5	2	4	3	4
5	5	3	5	3	4	3	5	4	3
4	3	4	3	4	2	1	2	1	2
1	4	3	1	3	1	4	3	2	4
4	1	2	1	2	1	3	1	2	5
4	1	4	3	4	3	4	3	4	2

i) Summarise the data using a suitable graphical summary to meet the researcher's objectives. Your graphical summary should also illustrate random variation in germination rates.

ii) Clearly describe the findings from the graphical summary constructed in part (i).

iii) Suppose the researcher had employed two experimenters to do the washing of seeds. The 50 observations presented in the first five rows of the table were collected by the first experimenter and the 40 observations presented in the last four rows were collected by the second experimenter. Use a suitable graphical summary to illustrate whether there are differences in the average germination rates obtained by the two experimenters.

2. In a study on comparing the diversity and abundance of birds at two sites, a researcher recorded the birds observed along line transects of 100 metres. The observations made by the researcher on 6 line transects at Site *P* and 4 line transects at Site *Q* are given below. Each letter indicates a code for the species label of the bird observed.

Site *P*

Line transect	Species labels of the birds observed
1	A,A,A,B,B,A,B,A,B,A,B,A,B,A,B,C,A,A,C,A,B,A
2	B,B,B,C,B,A,C,B,A,C,A,C,A,A,B,C,A,A,B,D
3	A,B,A,B,A,B,A,B,A,C,D,C,D,A,B,A,B,A,C
4	D,B,C,D,A,B,A,B,A,B,A,C,B,A,B,A,B,A,B,A,C,D,C,B,C,A,B,A,D
5	B,B,C,B,C,B,A,B,A,B,A,B,A,B,A,B,C,C,B,C,B,A,D,C,B,C,B,C,B
6	A,B,A,C,B,C,D,B,A,B,A,B,A,B,A,B,A,B,C,B,C,B,\B,B,B,B,B

Site *Q*

Line transect	Species labels of the birds observed
1	A,C,C,C,B,C,B,C,A,A,A,A,A,B,C,A,B,C,B,A,B,A,B,A,B,A,B,A,B,B,A
2	A,A,A,A,B,B,A,B,B,B,C,B,C,C,C,B,C,B,C,B,C,B,C,B,A,B,A,B,A,A
3	B,B,B,C,B,C,C,C,B,B,B,B,A,A,A,B,A,B,B,C,B,C,B,A,B,A,B,A,B,B
4	A,A,B,B,B,B,A,B,A,B,A,B,A,B,C,B,B,C,B,C,B,C,B,A,B,A,B,A,B,A,C

i) Use a suitable graphical summary to highlight whether the two sites differ with respect to the bird species found at the two sites and the abundance of birds.

ii) Clearly state the findings from the graphical summary constructed in part (i).

iii) Using a suitable measure, determine which site has more random variation in the total number of birds observed in a line transect. Clearly state your findings.

3. The following table summarises the times taken (in hours) by 60 students to study five lessons from a course material.

Time interval (in hours)	Number of students
10.0 – 10.4	6
10.5 – 10.9	11
11.0 – 11.4	27
11.5 – 11.9	8
12.0 – 12.4	5
12.5 – 12.9	3

i) Compute the sample mean.

ii) Compute the sample median.

iii) Based on the numerical data summaries constructed in parts (i) and (ii), what can you say about the shape of the distribution of studying times taken by students?

iv) Out of the two numerical data summaries computed in parts (i) and (ii), which one do you recommend to estimate the expected time taken by a student to study a lesson from the course material? Give reasons for your answer.

v) Based on the numerical data summary recommended in part (iv), give an estimate for the expected time spent by a student to study a lesson from the course material.