# Eastern University, Sri Lanka

## Second Year First Semester Examination in Agriculture 2004/2005

### CSC 2103 Introductory Statistics (2: 30/00)

**Answer all Questions**

**Time allowed: 2 hours**

1. a) A ball is drawn at random from a box containing six red balls, four white balls and five blue balls. Determine the probability that it is i) red ii) not red iii) red or white.

   b) A sample of ten measurements of the diameter of a marble gave 4.38 mm mean and 0.06 mm standard deviation. Find 95% confidence limits for the actual diameter.

   c) In a garden planted with 1000 papaya plants of which 520 are female plants. Do you agree with the hypothesis that the sex ratio in the papaya trees is 1:1?

2. 100 pupils were tested to determine their intelligence quotient (IQ) and the results were as in Table 1. All IQs are given to the nearest integer.

   **Table 1**

   | Intelligence Quotient | Number of pupils |
   | --- | --- |
   | 45 – 54 | 01 |
   | 55 – 64 | 01 |
   | 65 – 74 | 02 |
   | 75 – 84 | 06 |
   | 85 – 94 | 21 |
   | 95 – 104 | 29 |
   | 105 – 114 | 24 |
   | 115 – 124 | 12 |
   | 125 – 134 | 04 |

a) Construct a Histogram to demonstrate the distribution of these IQs.

b) Calculate the mean, standard deviation and variance of the distribution.

c) If two additional pupils were included in the range 85 – 94 IQ, would you expect the value of the standard deviation to increase or decrease or remain the same?

3. An experiment was conducted to investigate the effect of sowing rate on yield of carrot. The following data were recorded in a completely random manner.

| Sowing rate (kg / ac) | 1.0 | 1.5 | 2.0 | 2.5 |
|---|---|---|---|---|
| Yield (x $10^3$ kg / ac) | 4.2 | 4.4 | 5.4 | 5.2 |
| | 4.9 | 3.5 | 4.5 | 4.4 |
| | 4.4 | 4.2 | 5.8 | 3.9 |
| | 2.8 | 3.7 | 4.8 | 4.6 |
| | 3.2 | 4.4 | 3.9 | 5.3 |
| | 3.8 | 2.9 | 4.5 | 4.3 |

$$\Sigma x = 103 \qquad \Sigma x^2 = 455.14$$

a) Construct ANOVA table for this experiment.

b) Interpret the results using 5% significance level.

4. A scientist, working in an agricultural research station, believe there is a relationship between the hardness of the shells of eggs laid by chickens and the amount of a certain food supplement put into the diet of the chickens. He has selected ten chicken of the same breed and collected the data as in Table 2. (Hardness was measured on a 0 – 10 scale, 10 being the hardest. There are no units attached).

2

**Table 2**

| Amount of food supplement (x) | Hardness of shells (y) |
|:---:|:---:|
| 07 | 1.2 |
| 10 | 2.1 |
| 12 | 3.4 |
| 18 | 6.1 |
| 07 | 1.3 |
| 08 | 1.7 |
| 12 | 3.4 |
| 17 | 6.2 |
| 09 | 2.1 |
| 20 | 7.1 |

$$\sum x = 120 \qquad \sum x^2 = 1644 \qquad \sum y = 34.6 \qquad \sum y^2 = 164.02$$

a) Draw a scatter diagram of these data

b) Find the equation of the regression line of y on x.

c) Fit the regression line.

d) What does the scatter diagram suggest about the relationship between x and y.

e) Test the significance of the regression co-efficient at $P = 0.05$.

3