Q v 13 4 DUE TUES 10/5/2010

Please start each question on a new page. You are advised to show all working, where possible. Where an answer is wrong, some marks may be given for correct method, provided this is shown by written working. Solutions found from a graphic display calculator should be supported by suitable working, e.g. if graphs are used to find a solution, you should sketch these as part of your answer.

1. *[Maximum mark: 15]*

In an environmental study of plant diversity around a lake, a biologist collected data about the number of different plant species (y) that were growing at different distances (x) in metres from the lake shore.

Distance (x)	2	5	8	10	13	17	23	35	40
Plant species (y)	35	34	30	29	24	19	15	13	8

(a) Draw a scatter diagram to show the data. Use a scale of 2 cm to represent 10 metres on the x-axis and 2 cm to represent 10 plant species on the y-axis. *[4 marks]*

(b) Using your scatter diagram, describe the correlation between the number of different plant species and the distance from the lake shore. *[1 mark]*

(c) Use your graphic display calculator to write down

(i) $\overline{x}$, the mean of the distances from the lake shore;

(ii) $\overline{y}$, the mean number of plant species. *[2 marks]*

(d) Plot the point $(\overline{x}, \overline{y})$ on your scatter diagram. **Label this point M.** *[2 marks]*

(e) Write down the equation of the regression line y on x for the above data. *[2 marks]*

(f) Draw the regression line y on x on your scatter diagram. *[2 marks]*

(g) Estimate the number of plant species growing 30 metres from the lake shore. *[2 marks]*

10. Tony wants to carry out a χ^2 test to determine whether or not a person's choice of one of the three professions; engineering, medicine or law is influenced by the person's sex (gender).

(a) State the null hypothesis, H_0, for this test. *[1 mark]*

(b) Write down the number of degrees of freedom. *[1 mark]*

Of the 400 people Tony interviewed, 220 were male and 180 were female. 80 of the people had chosen engineering as a profession.

(c) Calculate the expected number of female engineers. *[2 marks]*

Tony used a 5 % level of significance for his test and obtained a p-value of 0.0634 correct to 3 significant figures.

(d) State Tony's conclusion to the test. Give a reason for this conclusion. *[2 marks]*

Working:

Answers:

(a) _____

(b) _____

(c) _____

(d) _____