UNIVERSITY OF NEWCASTLE UPON TYNE

SEMESTER 2 2004/2005

STATISTICS FOR MARKETING AND MANAGEMENT

Time allowed – 3 hours

Answer any **THREE** questions

Statistical tables will be provided

Marks will be awarded for notation, explanation, diagrams (where appropriate) and interpretation. State any assumptions that you feel are necessary.

Some formulae are given at the end of the examination paper.

1 (a) Explain the difference between analysis correlation and regression analysis.

(30 marks)

(b) Data on sales of shoes ('000 pairs), the price of shoes (£) and advertising expenditure (£ '000) are used in a multiple linear regression that generates the following result:

R^2	0.89		
n	40		
F	150.5		
	Coefficient	*St. error*	*t-stat*
Intercept	88.6	17.8	4.98
Price	-1.74	0.255	-6.83
Advertising expenditure	0.143	0.167	0.853

Explain and comment on these results. (70 marks)

2 (a) Explain the importance of probability in inferential statistics

(30 marks)

(b) In a large supermarket, 35% of customers purchase alcohol. Of the customers who purchase alcohol, three-quarters spend at least £100 in total in the supermarket. However, of those customers who do not buy alcohol, only one-fifth spend at least £100. What is the probability that a randomly chosen customer who has spent at least £100 in total has purchased alcohol? (70 marks)

3 Explain what is meant by statistical inference. How might a firm use statistical inference in its marketing or management decision making? (100 marks)

4 (a) Describe the *t* distribution and outline the conditions under which it is used in hypothesis testing and confidence interval estimation.

(30 marks)

(b) It is claimed that consumers each spend an average of £460 on presents at Christmas. However, a survey of 80 families shows that the average amount spent on presents is actually £425, with a standard deviation of £182. Statistically, is the claim valid? (70 marks)

5 (a) Explain the difference between population parameters and simple statistics, giving examples of each. (30 marks)

(b) If the price of bananas throughout the country is normally distributed with a mean of 90 pence per kilogram and a standard deviation of 11 pence, what proportion of bananas are sold at (i) less than 70 pence per kilogram, and (ii) more than 105 pence per kilogram? (70 marks)

6 (a) Explain the difference between parametric and non-parametric hypothesis tests, giving examples of each. (30 marks)

(b) The results of a survey show the sales of a number of small firms categorised by geographical region (see table below). Using these results, test whether sales are related to region. (70 marks)

	Geographical Region		
	South	West	North
Sales (£'000)			
<30	11	4	3
30-100	11	16	5
>100	6	22	12

FORMULAE

For the normal distribution: $X \sim N(\mu, \sigma)$

For the standard normal distribution: $Z \sim N(0, 1)$

where,

$$Z = \frac{X - \mu}{\sigma}$$

With sample data, $\bar{X} \sim$ approx. $N\left(\mu, \frac{\sigma}{\sqrt{n}}\right)$

and

$$t = \frac{\bar{X} - \mu}{\frac{s}{\sqrt{n}}}$$

For the chi-square distribution,

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$