

MAS1403

Quantitative Methods for Business Management

Assignment 1

Deadline

1.00pm (surnames A→M) or 4.00pm (surnames N→Z), Wednesday 9th December 2009.

Work not handed in by this deadline will not be marked.

Presentation

All of your work need not be typed, but I recommend using Microsoft WORD to write up your solutions to questions 1 and 2. Anything hand-drawn/written must be neat and clearly legible – marks will be awarded for presentation. You **must** use Minitab where indicated in question 1, and you **must** use your own personal dataset for question 2.

Submission procedure

Take your solutions to the Maths & Stats General Office, on the 3rd floor of the Herschel Building. Go to the window of the General Office and tell the secretaries that you want to hand in a project for MAS1403. They will ask you to sign a sheet as proof that you have handed in your work.

1. The data to be analysed in this question are taken from the results of a survey I conducted in the Kowloon area of Hong Kong in December 2005. The aim of part of this survey was to investigate the household expenditure of single men and women across three commodity groups. The units of expenditure are Hong Kong dollars (HK\$) and the commodity groups were as follows:

- ① Housing, including rent/mortgage, fuel and light.
- ② Foodstuffs, including alcohol and tobacco.
- ③ Other goods, including clothing, footwear, electronic goods and other consumables.

I randomly selected twenty single men, and thirty single women, aged between 21 and 30; the results for expenditure on the above three commodity groups, for each person selected, can be found in the Minitab worksheet HongKong.MTW. To access this file, go to the course website – via Blackboard, or directly at:

www.mas.ncl.ac.uk/~nlf8/Teaching/MAS1403/home.html

Scroll down to the section on Assignments and click on [Hong Kong data for question 1](#); the file containing the data to be analysed should open in Minitab automatically.

Now answer questions (a) – (e) overleaf.

- (a) What form of sampling was used to collect these data? Give one advantage, and one disadvantage, of the sampling technique used.
- (b) For each commodity group, and for both men and women separately, use Minitab to calculate the sample mean, median, standard deviation and inter-quartile range of the expenditures, and copy and complete the following table:

		Commodity group		
		1	2	3
Men	Mean			
	Median			
	St. dev.			
	IQR			
Women	Mean			
	Median			
	St. dev.			
	IQR			

- (c) Use Minitab to produce percentage relative frequency histograms for male and female expenditure on **commodity group 1**, and comment.
- (d) By hand, construct relative frequency polygons for male and female expenditure on **commodity group 2**, and overlay these polygons on the same graph. Comment.
- (e) *Either* using Minitab *or* by hand construct box-and-whisker plots to compare male and female expenditure on **commodity group 3**, and comment.

2. For this question, every student must analyse their own unique dataset. *Your mark for this question will be zero if you use another student's dataset!*

To access your own personal dataset for this question, go to the course website – via Blackboard, or directly at:

www.mas.ncl.ac.uk/~nlf8/Teaching/MAS1403/home.html

Scroll down to the section on Assignments, and click on the link that says **Personal datasets for question 2**. A new page should open, and you should then click on your name and print off your personalised datasets for question 2. You may, if you wish, use Minitab to help answer this question. *[Make sure you write down your dataset number in your solutions – this should appear at the top of the supplementary sheet]*

- (a) Produce appropriate graphical summaries for your data.
- (b) Produce appropriate numerical summaries for your data.
- (c) Write a short paragraph explaining your findings.

[Please turn over for question 3]

3. As the manager of a large electrical store you have the option to buy a bulk order of the latest mobile phone which you can then offer for sale in your store. Before you decide whether or not this would be a worthwhile investment, you consult your marketing team for advice.

Your marketing team advise you that, since this is such a new product, you *might* want to conduct some initial market research to test the viability of this mobile phone. Based on the recent launch of a similar product, they tell you that there is a 65% chance that this market research will come back positive; if this is the case, the probability of sales being 'good' is 0.75, otherwise sales will be 'poor'. If the market research comes back negative, the probability of 'good' sales drops to just 0.2; otherwise, sales will be 'poor'.

- (a) Are the variables 'Market research outcome' and 'Level of sales' independent? Explain your answer.
- (b) Given that the outcome of the market research is positive, what is the probability that sales are 'poor'?
- (c) What is the probability that the outcome of the market research is negative and sales are 'poor'?
- (d) What is the probability that sales are 'good'?

[Hint: Drawing a probability tree may help here!]

You know that if you go ahead without any market research, you can expect sales to be 'good' with probability 0.6; otherwise, sales will be 'poor'.

Your sales team have also given you the following information on likely costs and estimated income:

Buying the mobile phones	£300,000
Cost of market research	£20,000
Income if sales are 'good'	£500,000
Income if sales are 'poor'	£220,000

- (e) Draw a decision tree to represent this scenario.
- (f) Use your decision tree in part (e) to find *EMV*(Launch the product immediately) and *EMV*(Market research).
- (g) Based on your answers to part (f), what should you do?

[End of questions]