

MAS1403/ACE2013

Quantitative Methods for Business Management

Statistics for Marketing and Management

Assignment 2

Deadline

4.00pm, Friday 18th April 2008. Work not handed in by this deadline might not be marked.

Presentation

Your work for questions 1 and 3 can be hand-written, but must be neat and clearly legible. Marks will be awarded for presentation. Minitab should be used to answer question 2; your work for this question should be word-processed and must include all relevant Minitab output.

Submission procedure

Take your solutions to the Maths & Stats General Office, on the 3rd floor of the Herschel Building. Make sure you attach a cover sheet to your work, and fill out this cover sheet (see course website). Go to the window of the General Office and tell the secretaries that you want to hand in a project for MAS1403/ACE2013. **You will then be asked to sign for your project as proof that you have handed in this work.**

1. In the U.K., legislation dictates that “standard” bottles of wine should contain an average of exactly 750 ml. A sample of a dozen bottles of wine from an Italian wine importer gives the following results:

745 752 754 745 748 753 746 742 745 748 741 746

- (a) Construct a 95% confidence interval for the population mean volume of wine for this importer.
- (b) Perform a hypothesis test to see if the wine imported by this company meets U.K. legislation.
- (c) Does your confidence interval in part (a) support the outcome of your test in part (b)? Explain.

[Please turn over for questions 2 and 3]

2. “Athenia” and “Olympic Villas” are rival hotel companies offering luxury apartments for rental in Cyprus. Both companies claim to offer the cheapest luxury accommodation on the island. To determine whether or not there is any difference in price between the two companies, the Association of British Travel Agents (ABTA) takes a random sample of customers with both Athenia and Olympic and asks them how much they paid for their two-week stay in a one-bedroom luxury apartment in September 2007. ABTA then pass this data on to you for analysis.

The results (to the nearest £) are given in the first two columns of the Minitab Worksheet *Cyprus.MTW*; to access this file, go to the course website:

www.mas.ncl.ac.uk/~nlf8

Scroll down and click on [Cyprus data for question 2](#); then click on your name (if your name does not appear on this list then you should contact me asap!). The file containing the random sample of rental prices for the two companies should open in Minitab automatically. Don’t forget, everyone has a unique Worksheet for this question; **you will not get any marks for analysing the wrong dataset! You must use your own personal dataset!**

- (a) Produce some summary statistics for both samples by clicking on Stat-Basic Statistics-Display Descriptive Statistics. Enter C1 and C2 in the Variables box and click OK. Copy and complete the table below:

	Mean	St. dev.	Median	Min	Max
Athenia					
Olympic					

- (b) Use Minitab to produce appropriate graphical summaries for the two samples; you should copy-and-paste these into your solutions for this question.
- (c) Using your graphical and numerical summaries in parts (a) and (b), compare and contrast the cost of renting a luxury apartment with these two companies. Would you say there was any real difference in price?
- (d) You should now compare the costs between the two companies more formally by using Minitab to perform an appropriate hypothesis test. Remember to state your null and alternative hypotheses, and include any relevant Minitab output in you solutions. Write a few sentences explaining your findings to ABTA.

[Please turn over for question 3]

3. “Northern Lights”, the main electrical supplier to homes in Newcastle, believes that the time a customer takes to pay their electricity bill is related to the size of their bill. To investigate, their research team randomly selected 10 customers and recorded the size of their bill (x , in pounds) and the time it took to pay this bill (y , in days). The results are shown below.

x	400	105	205	150	460	250	315	420	100	300
y	35	15	18	20	30	22	25	34	10	20

- (a) Produce a scatterplot for these data, and comment on the relationship between the two variables.
- (b) The following summaries have been obtained for the above data:

$$\sum x = 2705 \quad \sum y = 229$$

$$\sum x^2 = 885275 \quad \sum y^2 = 5839 \quad \sum xy = 70720$$

Using these summaries,

- i) calculate the sample correlation coefficient, and comment;
 - ii) perform a linear regression analysis, and obtain the linear regression equation. Plot this regression line on your scatter diagram in part (a).
- (c) Northern Lights levy a “late-payment charge” if a customer takes longer than 30 days to pay their bill. Mr. Adams’ bill for 2006 is £375. Will he incur this late payment charge?

[End of questions]