

MAS1403/ACE2013

Quantitative Methods for Business Management

Statistics for Marketing and Management

Assignment 2

Deadline

1.00pm (surnames A→M) or 4.00pm (surnames N→Z), Wednesday 22nd April 2009. Work not handed in by this deadline will 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. A satellite TV store has newly opened for business and is open five days a week – Monday, Tuesday, Thursday, Friday and Saturday. The number of satellite TV orders each day during the first three weeks of business is shown below.

	Mon	Tues	Thurs	Fri	Sat
Week beginning 26/02/07	3	5	7	8	10
Week beginning 05/03/07	4	7	8	10	12
Week beginning 12/03/07	4	8	10	11	13

- Produce a time series plot of these data. Remember to label your axes and give your plot a suitable title.
- Comment on your time series plot in part (a).
- Calculate the moving averages for the number of satellite TV orders, based on a five-observation cycle.
- Fit the linear regression model

$$Y = \alpha + \beta T + \epsilon$$

to the series of moving averages, where the explanatory variable (T) represents time, and plot this regression line on your time series plot in part (a).

- Calculate the seasonal deviations by subtracting the moving averages from the original observations, and calculate the seasonal means.
- Calculate the seasonal effects for each day the satellite TV store is open. Remember to adjust your seasonal effects if they don't sum to give zero.
- Use the regression equation obtained in part (d), and the seasonal effects in part (f), to forecast the number of orders at the satellite TV store on Monday 19th and Friday 23rd March 2007.

[End of questions]