

LAND ECONOMY TRIPOS Part IA
LAND ECONOMY TRIPOS Part IB

Monday 28 May 2007, 09.00 – 12.00

Paper 3

ACCOUNTING AND DATA EVALUATION

Answer **five** questions

Section A has six questions, of which you are to answer **four**. You must answer each subpart of each question you choose, unless otherwise stated. *Section B* has two questions, of which you are to answer **one**.

Section A will be **weighted two-thirds** of the final mark for this examination and *Section B* will be **weighted one-third** of the final mark for this examination.

Answers to each section must be tied up separately with their own cover sheet.

A copy of the statistical tables is on your desk together with a list of statistical formulae.

Unless otherwise stated each part of each question carries equal weight.

<p>You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator</p>
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Section A**Question 1 [20 Marks]**

- (a) A hotel chain has developed a computer model to predict the profitability of sites it is considering for new hotels. If the computer model predicts large profits, the site is categorised as profitable and they will build a hotel. If the model predicts no more than small or moderate profits, it is not deemed profitable and they will not build at that location. This process can be expressed in hypothesis testing terms: The null hypothesis is that the site is not a profitable location. The alternative hypothesis is that the site is a profitable location.
- (i) Explain the risks associated with making a Type I error.
- (ii) Explain how each type of error (i.e., Type I or Type II) might impact the decision. Would the decision makers in this situation be more concerned about making one type of error in their selection of building sites for hotels? Why?
- (8 Marks)
- (b) Researchers are interested in determining the level of credit card debt the average consumer is carrying. Based on two random samples of 1,000 consumers each, the mean credit card debt was £2,411 in October 2006 as compared to £2,814 in October 2005. The sample standard deviation was £847.43 in October 2006 and £976.93 in October 2005. Assuming that the population variances from both years are equal, is there evidence that the mean credit card debt is lower in 2006 than in 2005?
- (7 Marks)
- (c) What is the conditional probability $P(A|B)$ if A and B are mutually exclusive events?
- (5 Marks)

[TURN OVER]

Question 2 [20 Marks]

- (a) A statistical analysis of 1,000 long-distance telephone calls from a London corporate headquarters indicates that the length of these calls is normally distributed with

$$\mu = 240 \text{ seconds and } \sigma = 40 \text{ seconds.}$$

- (i) What percentage of these calls lasted less than 180 seconds?
- (ii) What is the probability that a particular call lasted between 180 and 300 seconds?
- (iii) What length of call distinguishes the top 1% of longest calls?
(9 Marks)
- (b) If you want to be 99% confident of estimating the population proportion to within an error of ± 0.04 , what sample size is needed?
(5 Marks)
- (c) Researchers for Tesco contend that the average weekly family shop in England takes 22 minutes, with a normal distribution. A sample of shoppers at a local Tesco was studied. The mean shopping time for the sample of 50 shoppers was 25.36 minutes with a standard deviation of 7.24 minutes. Using the 0.10 level of significance, is there evidence that the mean shopping time at the local Tesco is different than the national average?
(6 Marks)

[TURN OVER]

Question 3 [20 Marks]

- (a) The board of directors for Topless Shops wish to predict annual sales for all new stores based on store size (square metres of selling space). To examine the relationship between the store size and its annual sales, a sample of 14 stores was selected and a regression analysis was conducted. The results of this analysis are summarised in the following table:

SUMMARY OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.950883275
R Square	0.904179003
Adjusted R Square	0.89619392
Standard Error	0.966379679
Observations	14

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	105.7476	105.7476	113.2335	1.82269E-07
Residual	12	11.20668	0.93389		
Total	13	116.9543			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	0.964473659	0.526193	1.832927	0.091727	-0.182003039	2.11095
X Variable 1	1.669862317	0.156925	10.64112	1.82E-07	1.327951303	2.011773

Based on these data:

- (i) What is the regression line for these data?
- (ii) Interpret the meaning of the slope in this situation.
- (iii) What do you conclude about the relationship between store size and annual sales for Topless Shops?

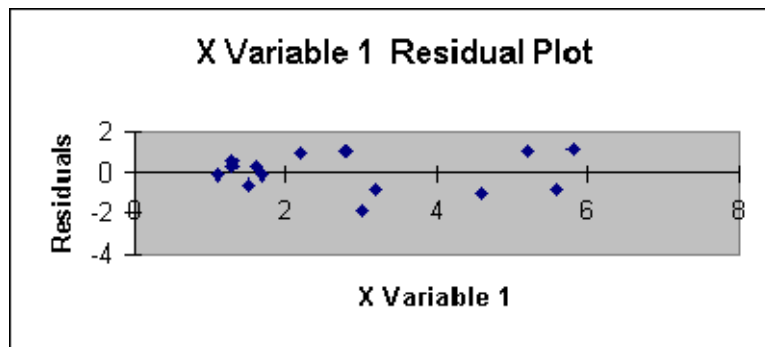
(10 Marks)

[TURN OVER]

QUESTION 3 CONTINUED

- (b) The following table and diagram offer information about the residuals analysis in the above regression analysis. What do you conclude about the residuals of Y?

(5 Marks)



RESIDUAL OUTPUT

<i>Observation</i>	<i>Predicted Y</i>	<i>Residuals</i>
1	3.803239598	-0.10324
2	3.636253367	0.263747
3	5.640088147	1.059912
4	10.31570263	-0.8157
5	3.135294672	0.264705
6	4.638170757	0.961829
7	3.135294672	0.564705
8	2.801322208	-0.10132
9	6.308033074	-0.80803
10	3.469267135	-0.56927
11	9.647757708	1.052242
12	8.645840318	-1.04584
13	10.6496751	1.150325
14	5.974060611	-1.87406

- (c) The increase or decrease in the price of a stock between the beginning and the end of a trading day is assumed to be an equally likely random event. What is the probability that a stock will show an increase in its closing price on five consecutive days?

(5 Marks)

[TURN OVER]

Question 4 [20 Marks]

- (a) Identify and explain the assumptions which must be met to perform regression analysis on a data set.

(6 Marks)

- (b) Two parallel production lines are used for mixing a given fertilizer. Operations managers suspect that, although the average amount in each can of fertilizer is usually the same, the variability of the cans filled in line A is greater than that of line B. The following sample data are obtained from filling 500 ml cans:

	Line A	Line B
Mean (\bar{x})	8.005	7.997
Std. deviation (s)	0.012	0.005
number (n)	11	16

Assuming that the population amounts filled are normally distributed for each production line, is there evidence that the variance in line A is greater than the variance in line B? (Use $\alpha = 0.05$)

(7 Marks)

- (c) When a customer places an order with an on-line service, a computerised accounting information system automatically checks to see if the customer has exceeded his or her credit limit. Past records indicate that the probability of customers exceeding their credit limit is 0.05. Suppose that, on a given day, 20 customers place orders. Assume that the number of customers that the system detects as having exceeded their credit limit is distributed as a binomial random variable.

- (i) What is the probability that no customers will have exceeded their credit limit?
- (ii) What is the probability that two or more customers will have exceeded their limits?

(7 Marks)

[TURN OVER]

Question 5 [20 Marks]

- (a) A researcher obtains a correlation of $r = -0.41$ for a sample of $n = 25$ individuals. Does this sample provide evidence that there is a significant, nonzero correlation in the population? Assume a nondirectional test with $\alpha = 0.05$.
- (5 Marks)
- (b) A large organisation is interested in determining whether an association exists between the commuting time of its employees and the level of stress-related problems observed on the job. A study of 116 workers reveals the following:

COMMUTING TIME	STRESS			Total
	High	Moderate	Low	
Under 15 min.	9	5	18	32
15-45 min.	17	8	28	53
Over 45 min.	18	6	7	31
Total	44	19	53	116

At the 0.01 significance level, is there evidence of a significant relationship between commuting time and stress?

(15 Marks)

[TURN OVER]

Question 6 [20 Marks]

- (a) A leisure parachuting club wants to determine if any significant differences exist in the strength of parachutes woven from synthetic fibres obtained from four different suppliers. [Strength is represented by the point at which a parachute tears apart, with larger numbers representing greater strength.] The results are as follows:

	Supplier One	Supplier Two	Supplier Three	Supplier Four
	18.5	26.3	20.6	25.74
	24.0	25.3	25.2	19.9
	17.2	24.0	20.8	22.6
	19.9	21.2	24.7	17.5
	18.0	24.5	22.9	20.4
Mean	19.52	24.26	22.84	21.16
Standard Deviation	2.69	1.92	2.13	2.98

At the 0.05 level of significance, is there evidence of a difference in the average strength in parachutes manufactured by the four different suppliers?

(15 Marks)

- (b) Explain the key characteristics and provide an example for each of the two following methods of sampling:
- (i) A simple random sample;
 - (ii) A stratified sample.

(5 Marks)

[TURN OVER]

Section B**Question 7**

Both parts of this question must be answered

You have the following summarised trial balance for Jingbo as at 30 June 2006. Further details are provided in the notes.

	£000	£000
Ordinary share capital		300
Preference share capital		25
Share Premium Account		22
Revaluation Reserve		19
General Reserve		125
Retained Earnings as at 1 July 2006		28
Patents	40	
Land & Buildings at cost	750	
Land & Buildings accumulated depreciation as at 1 July 2006		125
Motor Vehicles at Cost	355	
Motor Vehicles accumulated depreciation as at 1 July 2006		130
Fixtures and fittings at Cost	76	
Fixtures and fittings accumulated depreciation as at 1 July 2006		30
Long-term loan		40
Sales		1,450
Cost of Sales	500	
Administrative expenses	250	
Distribution expenses	125	
Taxation paid	112	
Ordinary dividends paid		9
Stock as at 30 June 2006	35	
Debtors	90	
Creditors		75
Cash	45	
	<hr style="border-top: 1px solid black;"/> 2,378	<hr style="border-top: 1px solid black;"/> 2,378

Notes (in £000's):

The following information has come to light after 30 June 2006:

- A motor vehicle was sold for £4. The book cost was £25 and accumulated depreciation to date is £12.

[TURN OVER]

QUESTION 7 CONTINUED

- There are the following amounts owing (administration): telephone £3, salaries £4.
 - The following amounts have been paid in advance (administration): Insurance £5.
 - Depreciation is to be charged at 2% on cost for land and buildings (used for administration); and 20% on cost for motor vehicles (used for selling and distribution) and 10% on cost for fixtures and fittings (used for administration).
 - There is a bad debt of £4.
 - It is now company policy to treat 5% of total debtors as at the year end as doubtful debtors.
- (a) Prepare, taking the above adjustments into account, the revised trial balance and Profit and Loss Account for the year ended 30 June 2006 and the Balance Sheet as at 30 June 2006.
- (b) Why should the Trial Balance balance?

Question 8

Answer **three** out of the following:

- (a) Why are the distinctions between capital and revenue reserves so important for a company?
- (b) What incentives do managers have to indulge in creative accounting?
- (c) What is working capital and how might this be managed?
- (d) Explain the role that the Annual Report plays in the corporate governance process.
- (e) Assets and liabilities are important for stewardship and profits important for decision making. Discuss.

END OF PAPER