EMBA J23 (2023-2025)
Analytics
Individual Assignment
Core Course
1 Credit

This assignment consists of three parts. Parts 1, 2 and 3 are worth 40, 20 and 40 marks, respectively.

Your report should be submitted as a PDF document, consisting of no more than **1,500 words**. The word count covers the main body of text, including in-text citations and direct quotations, and excludes figures, charts, tables, footnotes, reference list and bibliography.

Please do not include an appendix, and please do not submit an Excel spreadsheet.

Part 1 – Bond Computers

Bond Computers is developing and testing a new computer workstation, Spectre007, which it will introduce to the market in the next 6 months. Spectre007 will be sold under a three-year warranty covering parts and labour. The company has decided to subcontract the service support for the warranty and has entered negotiations about the support contract with Felix Support. Felix has proposed two different pricing schemes for the subcontract. The first involves the payment of a fixed fee of £1m and the second a variable fee of £240 per workstation sold, subject to a minimum fee of £0.5m. Under both schemes, the payment will be made one year after the introduction of the workstation to the market at which point the product will be replaced by newer models not covered by the warranty service subcontract. At the moment, there is uncertainty about the sales potential of the new workstation. Sales of Spectre007 are expected to come from two sources: (i) the successful closure by senior management of a major purchase of 1,000 units by a long-standing customer, (ii) the efforts of regional sales offices. Given the state of the negotiations with the long-standing customer, the current estimate of the probability of a successful closure of the major purchase is 50%. Regional sales of Spectre007 would be boosted by the successful closure, and the management of Bond Computers has estimated the regional sales potential (in addition to the major purchase), as shown in the table below.

If no major purchase		If major purchase	
Sales	Probability	Sales	Probability
1,000	20%	2,500	25%
2,000	30%	3,500	25%
3,000	30%	4,500	25%
4,000	20%	5,500	25%

(a) Use a decision tree to establish which of the two pricing schemes minimises the expected value of costs for Bond? (***15 marks***)

(b) By how much would the variable fee (currently £240) and the minimum fee (currently £0.5m) have to change before your answer to (a) changes? (***15 marks***)

(c) What is the most that Bond should pay now for information regarding whether they will achieve a successful closure of the major purchase? (Assume the variable fee is £240 and the minimum fee is £0.5m.) (***10 marks***)

Part 2 – Virus Testing

(a) Obtain the reported sensitivity and specificity for a test for COVID-19. Interpret these values. (Choose a test for which neither the sensitivity nor specificity is 100%.) (***5 marks***)

(b) Using a reasonable value for the prevalence of the virus, calculate the positive predictive value (PPV) for the test you identified. (***5 marks***)

(c) How sensitive is the PPV to the values you have used in its calculation? (***10 marks***)

Part 3 – Diamonds are Forever

A regression model is required to support the pricing of individual diamonds. The file Diamonds.xlsx contains the individual selling price and various characteristics of 10,000 diamonds. Here is a description of the variables in the dataset:

Price	Price in US dollars
Cut	1 (worst) to 5 (best), representing AGS grades fair, good, very good, premium and ideal
Colour	1 (worst) to 7 (best), representing GIA grades J to D
Clarity	1 (worst) to 8 (best), representing GIA grades I1, SI2, SI1, VS2, VS1, VVS2, VVS1 and IF
Carat	Weight in carats
Table	Width of the top of the diamond as a percentage of its widest diameter
Length	Length in mm
Width	Width in mm
Depth	Depth in mm
DepthPercentage	Depth divided by average of Length and Width

(a) Split the data for the 10,000 diamonds into a training dataset and a testing dataset. Discuss the motivation for splitting the data in this way. (***5 marks***)

(b) Using only the training dataset, estimate a regression model. Make sure to describe the steps of your modelling approach, and to interpret your model. (***25 marks***)

(c) Evaluate the accuracy of your model from part (b) in terms of its ability to predict the price of the diamonds in the testing dataset. Compare this with the accuracy of at least one other regression model estimated using the training dataset. (***10 marks***)

DEADLINE

[redacted]

All assignments must be submitted electronicall to the Student Assessment Management Syste [redacted].

To preserve your anonymity, please make sure you sign with your 7 digit Candidate Numbers, NOT your names.

If you submit the assignment to a place other than SAMS (e.g. via email) then this may be regarded as a non-submission.

Please contact the Assessment Team [redacted] for any questions relating to your submission.