

CAA GLOBAL

EXAMINATION

19 October 2022 (am)

Module 5: Models and Audit Trails

Time allowed: Three hours and fifteen minutes

INSTRUCTIONS TO THE CANDIDATE

1. You are given this question paper and an Excel file.
2. Mark allocations are shown in brackets.
3. Attempt all questions. Questions are to be answered as per ‘exam requirements’.

If you encounter any issues during the examination please contact the Assessment Team on T. 0044 (0) 1865 268 873.

Background

You are an analyst working for an actuarial consultancy firm that has been engaged by an airline to perform some analysis to help them make changes to their customer reward programme.

The airline's customer reward programme assigns its passengers with a different membership level based on their flight history. Each passenger's customer reward programme membership level is based on the total number of miles they have flown with the airline in the past year as follows:

<i>Total number of miles flown</i>	<i>Customer reward club membership level</i>
From 0 to 74,999	Blue
From 75,000 to 149,999	Bronze
From 150,000 to 299,999	Silver
300,000+	Gold

The airline has provided you with a sample set of passenger travel data for 200 customers. Each row of the data represents the flight history for an individual passenger. The columns of data represent the miles flown on each flight taken in the past year, up to a maximum of 100 flights.

You have been asked to perform some analysis on the sample passenger flight history data to determine the proportion of passengers in each customer reward club membership level.

The airline is considering making changes to its customer reward club and would like to understand how these would impact the proportion of members in its highest 'Gold' membership level. The two options being considered are as follows:

Option 1: Determine the customer reward membership level based on the number of flights taken with the airline in the past year as follows:

<i>Total number of flights taken</i>	<i>Customer reward club membership level</i>
From 0 to 9	Blue
From 10 to 19	Bronze
From 20 to 29	Silver
30+	Gold

Option 2: Determine the customer reward membership level based on the total number of miles they have flown with the airline in the past year as follows:

<i>Total number of miles flown</i>	<i>Customer reward club membership level</i>
From 0 to x	Blue
From x to $2x$	Bronze
From $2x$ to $3x$	Silver
$3x+$	Gold

The value of x should be determined so that, based on the sample passenger history data, 15% of customers are in the Gold membership level.

PART 1

- (i) Construct a spreadsheet model to include separate worksheets for data, data checks, parameters, current rules, Option 1, Option 2, charts and any other worksheets as required. [2]
- (ii) Carry out a range of checks on the data provided and comment on whether the data appears to be sensible, given the information that has been provided. You are NOT required to make any alterations to the data. [4]
- (iii) Identify and set out the parameters for the model you are going to use in the 'parameters' worksheet. [3]
- (iv) Calculate the total distance travelled by each passenger and use this to determine their current flying club membership level. [3]
- (v) Create a table showing the total number of Blue, Bronze, Silver and Gold flying club members, giving the proportion of members at each level. [4]
- (vi) Plot the proportion of members in each level on a suitable chart. [3]
- (vii) Calculate the total number of flights taken by each passenger and use this to determine their flying club membership level using Option 1. [3]
- (viii) Repeat steps (v) and (vi) using the results of step (vii). [4]
- (ix) Determine, using GOALSEEK or otherwise, the value of parameter x that results in 15% of passengers being assigned a Gold membership level under Option 2. [8]
- (x) Repeat steps (v) and (vi) using the results of step (ix). [4]

Marks available for spreadsheet model:

Model accuracy, completeness and good modelling techniques and data validation of initial data (part (ii)). [38]

Reasonableness and automated checks, other than in part (ii). [4]

[Sub-total 42]

PART 2

You need to document all your work in an audit trail so that a fellow analyst student (with similar experience to yourself) could:

- peer review and check your model.
- continue to work on your model.
- run your model on different assumptions or extend your model to allow for extra data fields or scenarios.

Your audit trail should include the following aspects:

- The purpose of the model
- A description of the data used
- Any assumptions you have made
- Any limitations of your assumptions or of the model
- Your methodology, i.e. a description of what you have done to calculate the required values, and how and where in the model you have done it
- An explanation of all the checks you have performed
- Your key results
- A description of the charts you have produced.

The audit trail should be in a separate Word document.

Marks available for audit trail:

Audit approach

- Fellow analyst student can review, check and modify the model. [8]
- Written in clear English. [4]
- Written in a logical order. [3]

Audit content

- All model steps accurately included. [21]
- All checks clearly recorded. [8]
- All steps clearly explained. [8]
- Clear signposting and labelling. [6]

[Sub-total 58]

[Total 100]

Additional guidance

Useful Excel functions

GOALSEEK

The GOALSEEK function in Excel can be used to determine the input values needed to achieve a specific goal. In the Data menu tab, GOALSEEK may be found in the What-If Analysis menu. It allows you to set a chosen cell to a specified value by altering a given input value.

END OF PAPER