MATH6146 Case Study: World Cruise

# Background

Carnival Corporation owns 9 different cruise lines and more than 100 ships. Its brands include AIDA, Carnival Cruise Lines, Costa, Cunard, Holland America Line, Princess Cruises, P&O Cruises Australia, P&O Cruises UK, and Seabourn. It sells cruises to customers across the globe with market-leading brand presence in North America, the UK, Germany, Italy and Australia.

Carnival UK is based in Southampton, home to P&O Cruises UK and Cunard. With 10 ships (11 ships from May) the two brands sell cruises to customers in 20 different countries, with its main markets being the UK 84%, North America 6%, Australia 5% and Germany 2%.

In this assignment, you will be focusing on their World Cruise offering, operated by P&O Cruises UK (e.g. see <https://www.pocruises.com/find-a-cruise/J501/J501>).

All holidays are assumed to start and finish in the UK. Where passengers embark or disembark somewhere other than Southampton, they will fly to/from their embarkation/disembarkation point. This flight cost is included in the prices of the holidays you have been given but will incur an additional cost for Carnival. Air availability can have an impact on the holidays that Carnival can sell.

Table 1 provides a summary of the full dataset, displaying the realised demand, average price and duration for each of the possible routes, and shows which sections of the whole cruise are used. This is available in Excel format (WorldCruiseSummary2024.xlsx). Where there is a zero in a column, the corresponding section is not used in that cruise, e.g. the top row corresponds to Auckland to Dubai and only uses the following sections: Auckland to Sydney, Sydney to Brisbane, Brisbane to Hong Kong, Hong Kong to Singapore and Singapore to Dubai. All other sections have zero occupancy for this cruise. A second data file (WorldCruiseData2024.csv) includes a more comprehensive set of data listing all bookings, including the cabin type, duration, cruise region, week in which the booking was made, week in which a cancellation was made (if relevant), embark region, debark region, price paid, number of people on the booking.

The ship has a lower-bed capacity of 2085. A lower-bed is a standard bed. Cabins may also be fitted with upper-beds which are either fold out beds or sofa beds. The ship has 4 cabin types, known as “submetas”. These cabin types are S (Suite), B (Balcony), O (Oceanview) and I (Inside). Each cabin will normally have two beds. Their lower-bed capacities are 150, 1290, 310 and 335 respectively. Single travellers pay a supplement if they are the sole occupants of their cabin.



Table 1: 2022 World Cruise routes. This can be found in ‘WorldCruiseSummary.xlsx’

# The Task

Working in groups, you will present your findings in person on 29 February 2024. You should produce:

* A presentation lasting no more than 12 minutes that answers the questions in the following section. Assume the audience is the RM team at Carnival Cruises.
* Copies of your slides should be uploaded to Blackboard before 9am on 29 February 2024 to aid with marking and vetting and to allow sharing with Carnival Cruises.

# Questions

Using the data given on this worksheet, the presentation given at the start of the case study and any other information that you think is relevant, you should discuss the following points.

1. You have been given data on the realised demand for the world cruise in 2022 in WorldCruiseData2024.csv, which is summarised in WorldCruiseSummary2024.xlsx. Carnival believe that they were meeting the demand for the routes of more than 50 nights, but that there may have been some untapped demand on shorter routes. Provide two or more scenarios for demand in 2025 making it clear what assumptions you have made. These should provide demand estimates for each cabin type and each route.
2. Find the optimal number of passengers to allocate to the different holidays in order to maximize revenue for each of the scenarios generated in question 1. Comment on how Carnival UK should make use of these results. If you are suggesting increases to allocations for some holidays, you may wish to comment on how achieving higher passenger numbers may impact on the profit, e.g. through the costs of promotions.
3. Estimate the cancellation rates for different sectors of the world cruise in 2022 and comment how these estimates could be used in 2025.
4. Using your estimates of cancellations, suggest suitable overbooking strategies for the different routes, being careful to indicate the potential risks and rewards involved. List any assumptions that you make.

# Marking

The case study counts for 30% of your mark for MATH6146. It will be marked out of 100 and then rescaled. The allocation of marks is as follows:

* Quality of answers to the questions given in the brief - 60
* Innovative ideas - 10
* Quality of the presentation - 25
* Evidence of good group work - 5

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