

# Answers

## 1a) Identify the most and least trafficked routes

- The bar charts show that the Sydney to Auckland route seems to be the most traveled with almost 3 million passengers total, whereas the Melbourne to Denver route is rarely used with 0 passengers.

## 1b) Analyze trends and/or geographical patterns

- Asia is the region most traveled to from Australia, which could relate to tourism or students traveling for education. In 1989, there must have been a change/restriction in legislation or availability for leaving Australia.
- Lots of people traveled from Hong Kong and Singapore into Australia. On the other hand, the greatest number of people traveling out of the Australia went to the UK and the US in 1989.

Most of the time, travel appears to be balanced. Information could be interesting to see how populations change over time.

## 2a) Your model should predict passenger traffic for the next 6–12 months on at least 1 city pair.

### Sydney-Auckland Route

54	1989-07-01	58510.240072
55	1989-08-01	53905.147889
56	1989-09-01	60344.778075
57	1989-10-01	60810.279115
58	1989-11-01	57662.267413
59	1989-12-01	68684.988928
60	1990-01-01	61237.930183
61	1990-02-01	52304.278827
62	1990-03-01	54731.538525
63	1990-04-01	54534.961592
64	1990-05-01	47721.549643

### **3a) Explain your model choices — why did you choose the elements you did**

- I chose to use Prophet because it automatically handles the seasonal patterns found in traffic data like travel seasons and holiday spikes, while also having uncertainty intervals, which definitely helps with data as unpredictable as airline data. Prophet also has the ability to break down traffic data into components, like trends, seasonality, and holidays, which make the model suitable for interpreting traffic patterns on different levels.

### **3b) Evaluate the model's performance & report the accuracy of the model**

- The R2 score showed that the model explained a decent amount of variance in the passenger traffic data, indicating a good overall fit. However, the MAE was around 3,500 passengers per month, which might seem high but I believe it is expected due to the natural ups and downs in airline traffic. The MSE on the other hand was relatively large, likely because it penalizes large prediction errors more heavily, and there were big fluctuations in the data over the months. While the error values were not perfect, they do reflect the unpredictable nature of monthly travel data.

### **4a) Which routes should AeroConnect invest more in or scale back from?**

- AeroConnect should consider investing more in more popular routes like Sydney–Auckland, which show strong and consistent growth in predicted passenger traffic. These routes show rising demand and potential for higher return trips. In contrast, routes like Melbourne–Port Vila show declining trends in future forecasts, suggesting that AeroConnect may want to scale back or re-evaluate service on those connections.

### **4b) How can AeroConnect use this model going forward?**

- AeroConnect can use this forecasting model to predict monthly passenger traffic for each city pair. This helps them plan ahead for resource allocation, like scheduling aircraft, crew, and gate assignments. It can also support strategic decisions, like adding capacity on growing routes and reducing flights on declining ones. Over time, the model can be retrained with new data to improve accuracy and adapt to changes like holidays or global events.