

## Final Project

Date Due: May 12, 2026 by Midnight

Instructor: Trani

### **Rules:**

Include a brief writeup of the answers and explain your solution

Include the Excel or Matlab files used to solve the problem

Send me the Excel or Matlab scripts for review

Include VT Honor Code Pledge

### **Problem 1**

The goal is to perform an assessment of the recent capacity changes at San Francisco International Airport (see Figure 1). The following article and sources are required for your assessment:

Read the AvWeb article to understand the runway capacity reductions.

<https://avweb.com/aviation-news/faa-restricts-sfo-landings/>

Download and study the FAA published capacity diagram for SFO at:

[https://www.faa.gov/sites/faa.gov/files/airports/planning\\_capacity/profiles/SFO-Airport-Capacity-Profile-2019.pdf](https://www.faa.gov/sites/faa.gov/files/airports/planning_capacity/profiles/SFO-Airport-Capacity-Profile-2019.pdf)

Download the hourly flight schedules at SFO using the FAA Terminal Area Forecast (TAF). For this analysis use the average demand (arrivals and departures) for the week August 1-8, 2025.

### **Task 1: Airport Delays due to Reduced Capacity**

Use the FAA published new airport capacity (see article above) to assess arrivals delays at the airport using the average arrival demand for the week of August 1-8, 2025. Assume the new arrival capacity applies to VMC weather conditions.

### **Task 2: Airline Responses**

Based on your assessment in Task 1, and knowing that the SOIA operating procedures may not be possible in the future, suggest some actions by the airlines operating at SFO that could mitigate the delays in the future at the airport. Be specific about changes to the future flight schedules considering the new capacity and the expected future delays.

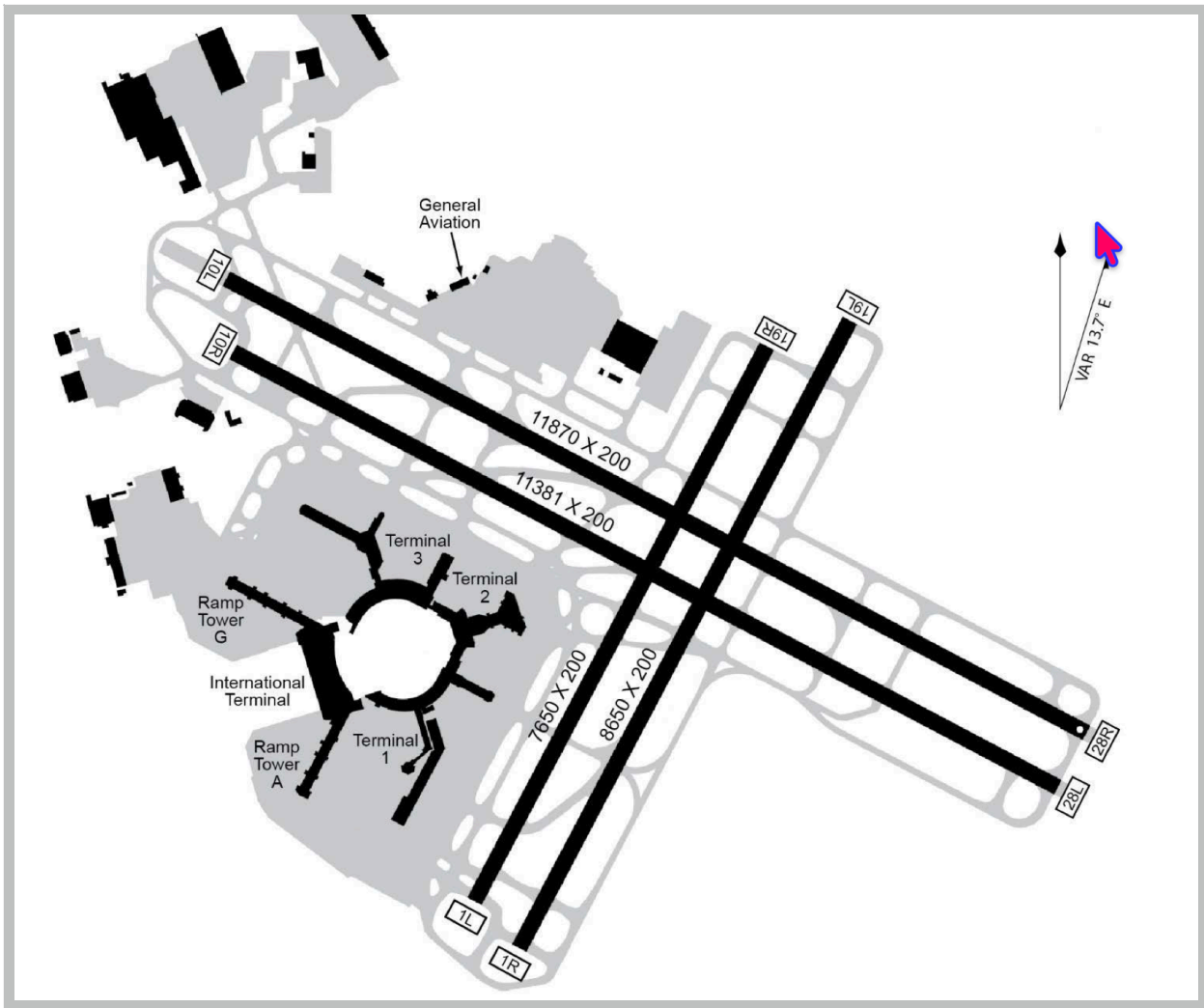


Figure 1. San Francisco International Airport Layout.

## Problem 2

Use the Airline Scheduling Problem (ASP-1) analysis explained in class with the following characteristics. The airline is evaluating the purchase of new generation regional aircraft (i.e., Transonic Truss-Braced Aircraft - TTBW) to operate from its base at LGA airport. The new airline wants to operate in the markets shown in Table 2. The following aircraft are potential contenders for possible use by the airline: Boeing 737-800 and the TTBW.

a) Calculate the fares to be charged in each O-D pair if the airline wants to recover its full cost for service plus a 10% profit. In your calculation assume the hourly operating cost of the aircraft shown in Table 1. Note that in order to estimate the operating cost in Table 1, the rule suggested is 3.5 times the hourly fuel burn cost of the aircraft flying at 35,000 feet and Mach 0.79. Use the mass parameters stated in Table 2. Use the current value of fuel price in the IATA Fuel Monitor website (<https://www.iata.org/en/publications/economics/fuel-monitor/>).

b) Comment your assessment of the economics of using new generation TTBA in the proposed routes based on the calculations in Task 1.

All other parameters of the model are the same as ASP-1.

**Table 1. Aircraft Operating Cost and Performance.**

| Aircraft   | TTBA   | Boeing 737-800   |
|--|--|--|
| Seats  | 148  | 154  |
| Block Speed (knots)<br>Gate-to-Gate                          | 365  | 380  |
| Operating Cost (\$/hr)                                       | 3.5 x Fuel Burn Cost at<br>35,000 feet at Mach 0.79<br>(mass = 67,000 kilograms) | 3.5 x Fuel Burn Cost at 35,000<br>feet at Mach 0.79<br>(mass=74,000 kilograms) |
| Typical maximum aircraft utilization<br>(hrs/day) in service | 12.5   | 12.5   |

**Table 2. OD Markets for the Proposed New Airline.**

| Origin-Destination Airports | Daily Demand (passengers) |
|-----------------------------|---------------------------|
| LGA-ATL                     | 700                       |
| ATL-LGA                     | 680                       |
| LGA-BOS                     | 510                       |
| BOS-LGA                     | 490                       |
| DCA-LGA                     | 610                       |
| LGA-DCA                     | 600                       |

- c) Find the number of aircraft TTBW or Boeing 737-800 needed to satisfy the demand considering the maximum utilization constraints.
- d) Find the number of daily flights (i.e., flight frequency) needed to satisfy the demand. Assume a load factor of 0.82.
- e) Find the airline daily profit to the airline.