

AoCMM 2018

Keep in mind that you are not expected to complete both problems. Try your best on one of them before moving on to the other, since prizes will be given to not only the teams that score the highest total of the two problems, but also the teams that place among the highest for one of the two problems.

1. In the Middle-earth, an insurance company published a new type of insurance: Trip Delay Insurance, targeting air passengers. Whenever a flight arrival is delayed, a reimbursement will be offered based on the flowing chart:

Delay Time (hours)	$2 \geq$	2 - 4	4 - 6	6 - 8	$8 \leq$
Compensation	\$100	\$200	\$300	\$400	\$600

However, due to Typhoon Mangkhut, 10 airports are unable to function for 4 hours (20:00 - 00:00) and flights scheduled in this time slot are forced to push back to the next day. Facing the risk of bankrupt, the insurance company has therefore bet its last hope on you, the Operational Management Specialist, to figure out a new schedule for the next day (flights originally scheduled on that day and flights delayed) that will minimize the company's cost. The map of flight routes among these 10 airports is shown below. How would you arrange the schedule if:

- 1) Only passengers from *Pontheugh* adopt the Trip Delay Insurance?
- 2) Passengers from all 10 airports adopt the Trip Delay Insurance?

Note: When you are making the schedule, please keep these in mind:

- a. Flights travel back and forth between 2 airports. Upon arrival, it takes at least 1 hour to clean up and prepare for the next flight. If one flight is delayed, the corresponding flight back may be influenced.
- b. Each airport has a limited number of lanes (capacity), so the total number of flights departing and arriving at the airport cannot exceed its capacity at any given time.
- c. A certain portion of passengers traveling to international airports might want to catch another flight there. Do your best to avoid the situation that they arrive after the transfer flight leaves.

Attached is the schedule of all flights among these 10 airports. It can also be found on:

<https://drive.google.com/file/d/1laFXUZOCteGjJwUe7wEXbRIUxggFlyLf/view?usp=sharing>

<https://www.dropbox.com/s/ia7t7wne4jcs37e/FlightSchedule.xlsx?dl=0>

Map of airports can be found on:

https://drive.google.com/file/d/1lcfA8eFxEEjI8VMwIZX4okYClwU64NQ_/view?usp=sharing

<https://www.dropbox.com/s/k6vz36k148l3qi5/Map.png?dl=0>

In *Middle-earth*, airplanes need 15 minutes to depart. Please round your answer to the nearest quarter (i.e. 9:00, 9:15, 9:30, 9:45, etc).

2. As one of the largest news and social networking website, Twitter is full of various news and information, real or fake. During the election, a fake news writer posts that Pope Francis supports Donald Trump. The news spread at an incredibly fast rate until 3 days later, a fact-checking website posts on Twitter saying that no proof shows that Pope Francis is related to Donald Trump. How long does it take to inform majority (90%) of Twitter users who have seen the fake news that it is actually a fake news?