UGBA 141
Discussion 8

Agenda: Midterm Solutions
- Newsvendor
- Inventory Buildup

Mar 11, 2022

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Reminder

- Schedule Meeting with the Meta project sponsor
  - First meeting before spring break
  - Team leaders need to be in the meeting; other team members are highly encouraged to attend but don’t have to if not available
- Midterm submission available on Gradescope
  - Grades will be out by this weekend
  - There will be time window for submitting regrade request

G Kristen's Boba Empire Q19

Kristen owns 4 boba (bubble tea) shops of similar size. Currently, she faces the problem of employee absenteeism. For each employee short, profits decline by $50. To deal with this problem, Kristen has identified several retirees who are willing to fill in for absent employees as "on-call" employees. Every evening, she calls the specific retirees who will be on-call the next day. Any on-call employee for the day can get 2 free drinks (which cost the shop $10 for two free drinks), even if the regular employee does show up to work. The need for on-call employees on a typical day at each shop is independent and identically distributed as a Normal distribution with a mean of 2 employees and a standard deviation of 1 employee.

Q19. If Kristen operates the on-call employee staffing independently for each shop (e.g., using a dedicated pool for each shop), how many on-calls she should staff in total across four shops?

Solution. Newsvendor in disguise

Newsvendor in a Broader Sense

- D demand is random; quantity Q needs to be decided
- G gain as known as underage cost
- L loss as known as overage cost
- Total cost function

$$C(Q, D) = L\max\{Q - D, 0\} + G\max\{D - Q, 0\}$$

- Given CDF F of demand D, the optimal Q^* that minimizes $C(Q, D)$ satisfies

$$F(Q^*) \leq \frac{G}{G + L}$$

G Kristen's Boba Empire Q20

Q20. (1.25 point) If Kristen instead uses a shared pool of on-call employees for all four shops and decides very last minute which location to assign to each confirmed on-call employee, how much money can she save on free drinks for on-call-employees?

Solution. The idea of risk pooling

D Oakland International Airport

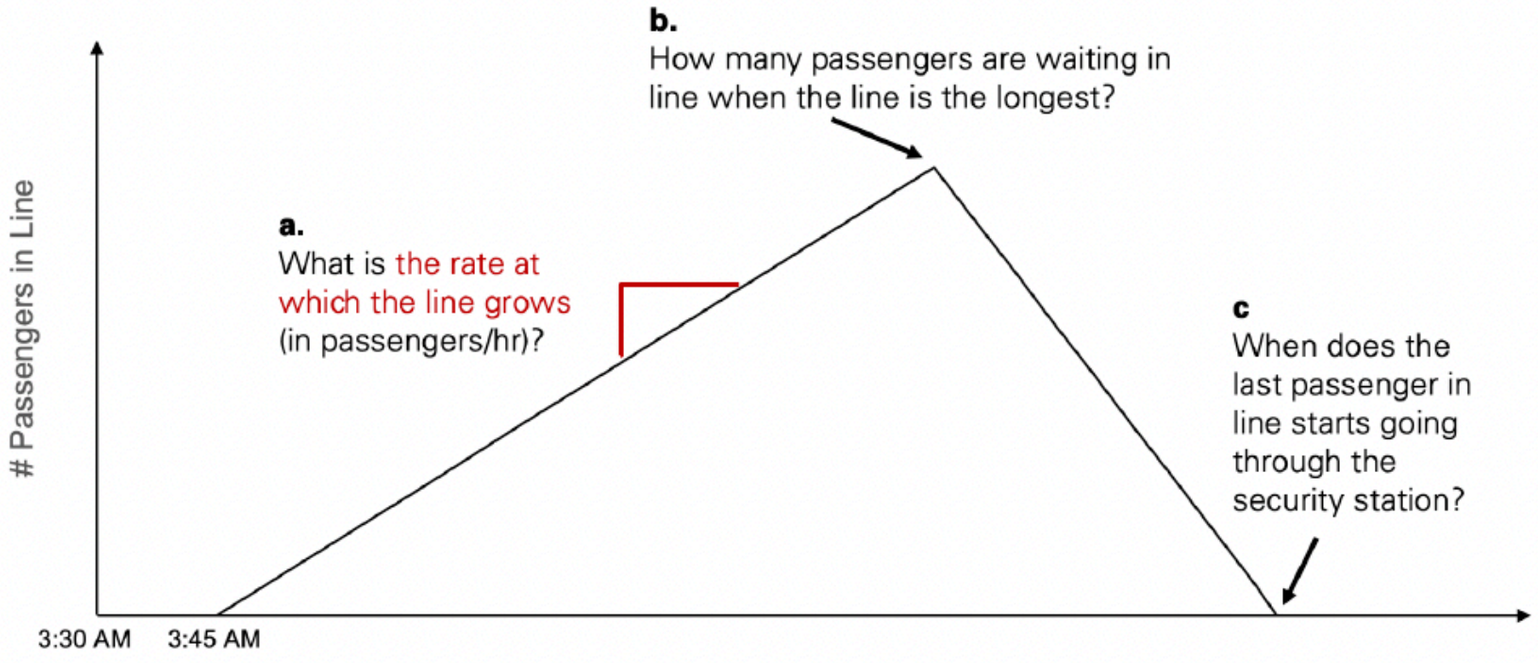
The Oakland International Airport (OAK) is initiating a new set of early morning flights.

- 4 new flights, all departing at 6:00 a.m., will be the first flights of the day.
- There are no other departures until 12pm.
- Each plane has exactly 150 passengers. No no-shows/cancellations.
- For each flight, passengers begin arriving 2 hours and 15 minutes before the scheduled departure and continue arriving until 45 minutes before departure; they arrive steadily.

OAK is determining the number of security stations to handle this new set of flights.

- Each security station can process 90 customers per hour.
- Each passenger must begin security processing 20 minutes before the scheduled departure to make her flight. It is required that all passengers must make their flights.
- Total cost of one security station is $500 / operating day (from 0am to 11:59pm).
- OAK cares not only about the station's cost, but also about the experience of passengers. The passenger waiting cost is incurred at a rate of $3/passenger/hour.

Q9. The first proposal is to have 3 stations. Below is a partial inventory buildup diagram.



Other Questions