Professor Goodchild

Problem 1

An air cargo company uses the airport in Richmond, California, as a west coast collection facility (to transfer goods between aircraft, and to transfer to trucks for local deliveries). They operate two types of planes: small planes that serve regional destinations and can carry 50 packages, and large planes that serve major urban centers and can carry 500 packages. The landing and take-off schedule at Richmond is shown below:

Inbound small plane	Every hour, beginning at 6:15 am, at 15 min past the hour.
Inbound large plane	Every hour, beginning at 6:00 am, on the hour.
Outbound small plane	Every hour, beginning at 9:45 am at 45 min past the hour.
Outbound large plane	Every hour, beginning at 9:30 am, on the half hour.

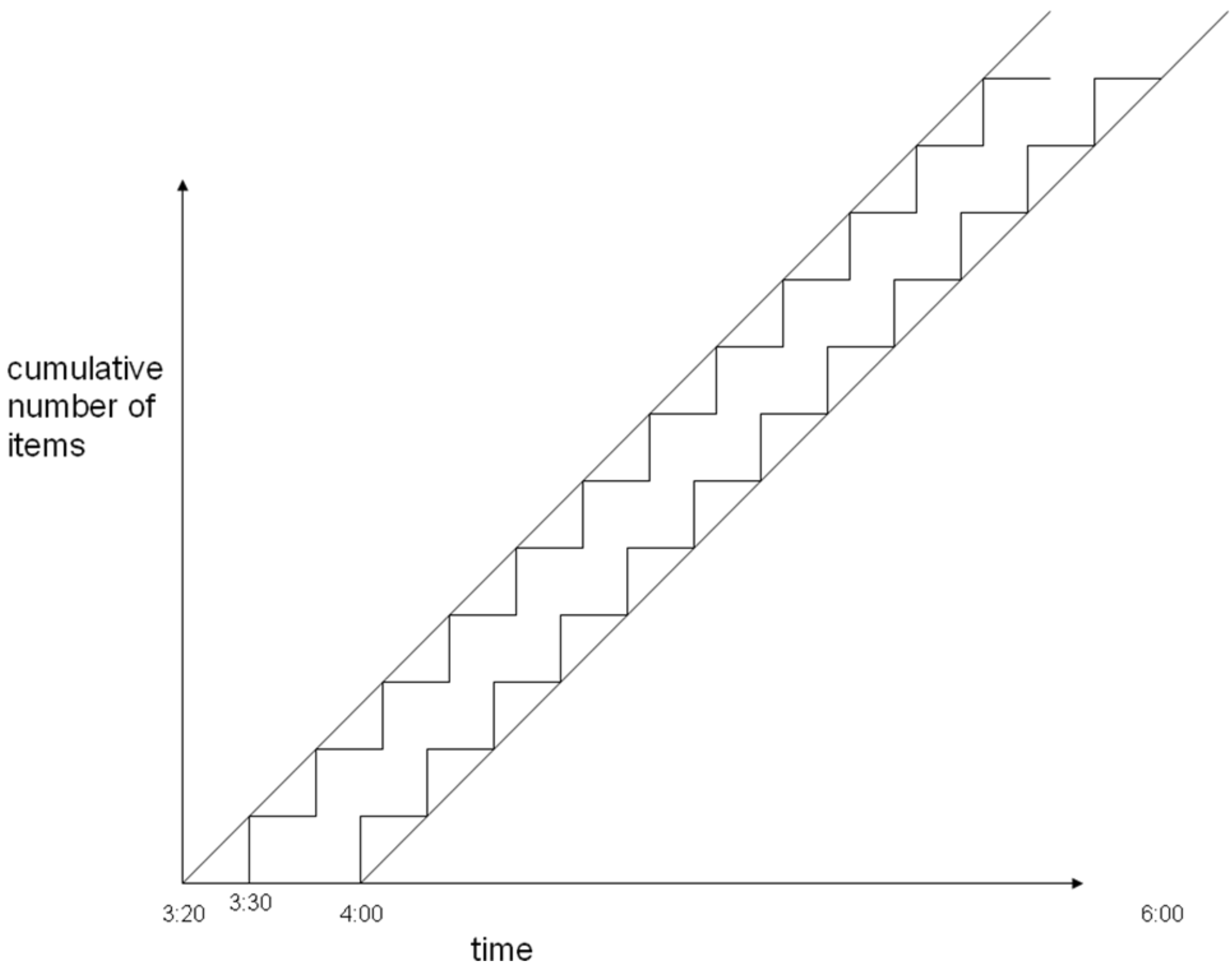
What is the *minimum* time that a package spends at Richmond?
9:15 to 9:30 or 15 minutes
What is the *longest* time that a package spends at Richmond?
Can’t say, don’t know if the system is FIFO
List one thing the air cargo company could do to their **flight schedule** to reduce the minimum time a package spends at Richmond?
Shift the outgoing flights earlier by as much as 15 minutes

Problem 2

A group of entrepreneurial College students sell cold drinks on campus on warm Friday afternoons. They currently have permission to work on campus between 4:00 pm and 6:00 pm on Fridays only. Because they don't have a mobile refrigeration unit, they need to deliver the drinks frequently. One friend stays on campus to receive deliveries and sell (at a constant rate), one stays in the apartment making drinks (at a constant rate), and the rest use their bikes to deliver drinks back and forth between the apartment and campus. The students can manage to carry 10 drinks per trip without accidents, and the ride takes about 25 minutes (you can assume it always takes 30 minutes). Assuming they can sell drinks on campus at a rate of 1 per minute, how many students are required to do bike deliveries to meet the demand?

6 (3 travelling to campus at any point in time, and three returning)

Draw a cumulative number of items versus time diagram for the logistics system. Include production at the apartment, shipments from the apartment to campus, deliveries to campus, and consumption on campus. Be sure to draw your figure to scale for one Friday afternoon period.



The cost of each trip is $50 plus $.50 per drink, and they can sell the drinks for $10.00 each. The students share the profits equally. Besides charging more per drink, what can the team do to increase their profit? If this includes extra staff or equipment, how much are they willing to pay for these services?

Cost per Friday: 50*12+.5*120=$660
Revenue per Friday: 120*10=$1200
Profit per Friday = $540

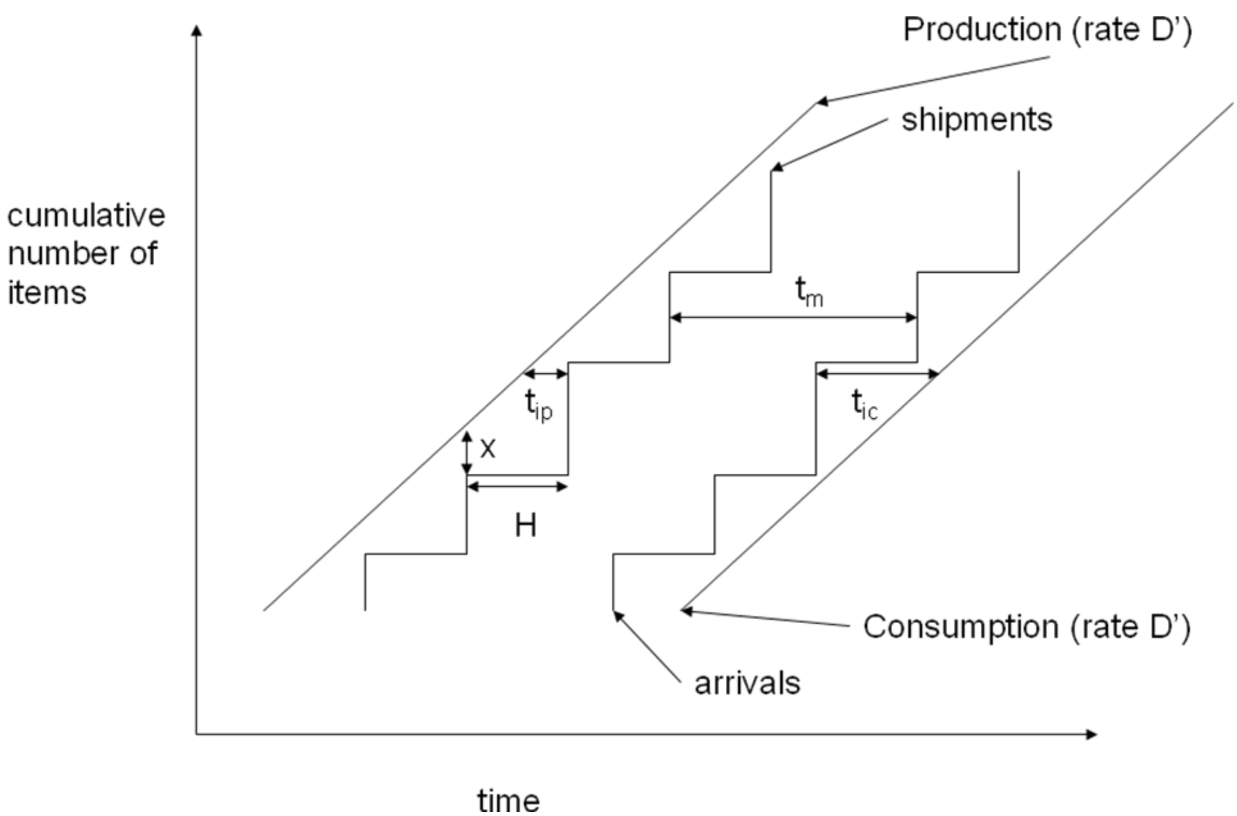
The group should consider moving production closer to campus. They should be willing to pay up to $540 in added costs.

Problem 3

The figure below shows the cumulative number of items against time for the production, consumption, and movement of goods between two facilities in a FIFO supply chain. On the figure please indicate:

a) the production rate, D'
b) the consumption rate, D'
c) one headway, H
d) the shipment curve
e) the arrival curve
f) one item's time in transit, t_m
g) one item's time in inventory ($t_{ip}+t_{ic}$).

Provide a description for x.
The amount of inventory at the production location immediately after a shipment goes out.
Provide a function for shipment size, T, in terms of H, D', and x.
T=D'H
Write an expression for minimum storage size (in number of items) at the production location in terms of T, H, D', and x.
D'H+x or T+x



Problem 4

Explain why using shipment curve (2) is always preferable to shipment curve (1). The curves are identical, only one is shifted to the right of the other.

Operating with shipment curve 2 instead of curve 1 reduces inventory at the production location.