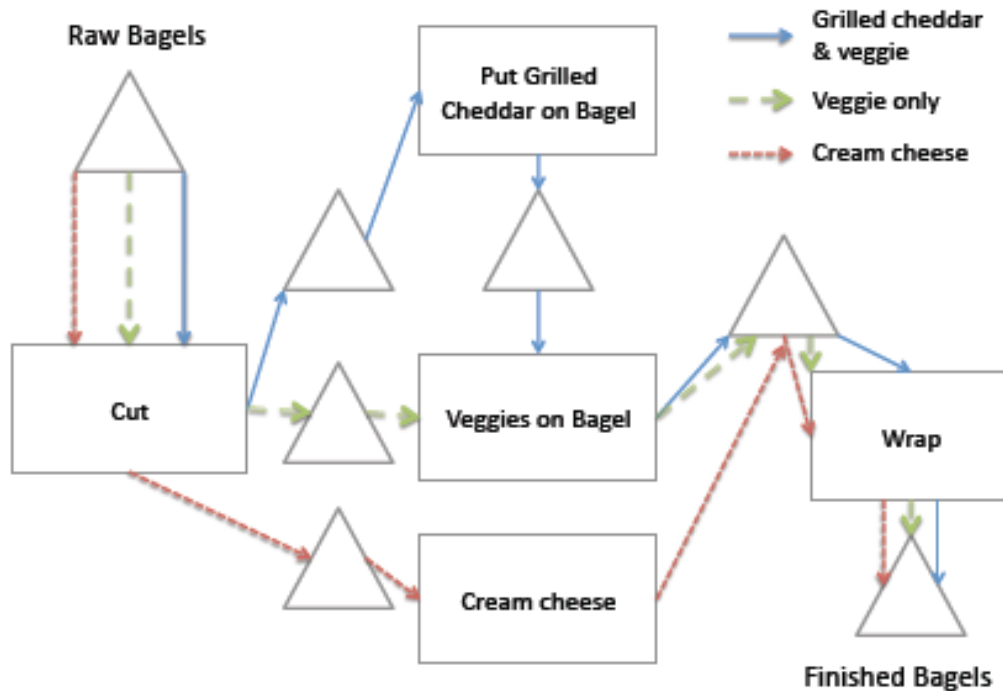


**Assignment 1: Day 2**

(Numbers in parenthesis are maximum marks for answers)

1. The market at the UBC farm every Saturday morning offers fresh organic produce that mostly comes from the farm itself. The counter opens at 9am. However, customers start lining up at 8:30am. Customers show up at a rate of 30/hr until 9:30am and then at a rate of 15/hr until 10:30. The counter can serve at a rate of 20/hr, and the counter works till all customers served.
  - a. Draw a graph of the number of customers waiting in the line. Start the graph at 8:30am and show the number of waiting customers until the line is empty again. (Use the continuous time setting.) (4)
  - b. Using the inventory build-up diagram, calculate the average number of customers in line. (4)
  - c. How long an average person spends in the line? (Hint: Little's Law.) (4)
  
2. Consider a bagel store selling three types of bagels that are produced according to the process flow diagram outlined below. We assume the demand is 180 bagels a day, of which there are 30 grilled cheddar & veggie, 110 veggie only, and 40 cream cheese. Assume that the workday is 10 hours long and each activity is staffed with one worker.



Moreover, we assume the following activity times:

<u>Activity</u>	<u>Activity Time</u>
Cut	3 min/bagel
Grilled cheddar	10 min/bagel
Veggies	5 min/bagel
Cream cheese	4 min/bagel
Wrap	2 min/bagel

Activity times are independent, of which bagel type is processed at a resource (for example, cutting a bagel takes the same time for a cream cheese bagel as for a veggie bagel).

- (a) Where in the process is the bottleneck for each kind of bagel? Where is the bottleneck for the product mix? Is it possible to satisfy the demand for the whole day? (8)
  - (b) Given the product mix, how many units can the process produce within one hour? (10)
3. Some data from the financial statements of K-Mart and Walmart for 2000 follow. From this information, which of the retailer stores has been more successful? Justify your answer. All figures are in millions of US dollars. (8)

	<u>K-Mart</u>	<u>Walmart</u>
Inventory	6,500	19,793
Cost of Goods Sold	29,732	129,664

4. The Ministry of Health Services, British Columbia, announced the following data:

<u>Average Patients Waiting</u>	<u>Average Wait Time</u>	<u>Average surgeries performed</u>
414	64 days	3.5 per day

Based on your understanding of Little's Law, are the above three reported numbers consistent? (6)

5. Firms often fail to match their product with the appropriate process; in other words, they are not on the diagonal of the product-process matrix. What are the costs associated with being above or below the diagonal. You may limit your answer to one short paragraph, but please be specific. (6)

Total Marks 50