Question 1 (1 point)

A Canadian restaurant chain has just opened a sit-down location at the Ottawa International Airport (YOW). Next to this sit-down location, it has also established a “to-go” section where customers can purchase pre-made food including sandwiches and salads, as well as drinks. Which dimension of the operation's performance is particularly emphasized with the "to-go" section ?

- Price
- Timing (Delivery)
- Fit
- Conformance quality

Consider the following four hotels competing on the dimensions of price ($ per night) and amenities (measured by the number of starts * awarded by customer reviews). Which of these hotels are on the efficient frontier ? You may select more than one answer.

Hotel A: price $200 per night, rating: ***
Hotel B: price $150 per night, rating: ****
Hotel C: price $300 per night, rating: *****
Hotel D: price $80 per night, rating: **

Instructions: *You may select more than one answer. In case of multiple answers, points are distributed evenly across all answers. Points are assigned based on answers correctly selected minus wrong selections.*

- [ ] Hotel A
- [ ] Hotel B
- [ ] Hotel D
- [ ] Hotel C

Question 3 (2 points)

During a typical Saturday, a branch of SuzyQ donuts shop in Ottawa serves 1,200 customers during the 10 hours period it is open. A customer spends, on average, 6 minutes in the shop. On average, how many customers are in the shop simultaneously?

Note: Round your final answer to the nearest integer. Do not include any decimal points or quotation marks (i.e. use 14 as opposed to 14.0 or “14” or "fourteen")

Question 4 (1 point)

Improving productivity in the service sector is more difficult than manufacturing.

- True
- False

Question 5 (3 points)

What are three main enemies of operation ?

Note: you earn full points only when all correct answers are selected and all incorrect answers are left blank.

- [ ] Low inventory

- [ ] Variability
- [ ] Poor scheduling
- [ ] High price
- [ ] High inventory turnover
- [ ] Timeliness
- [ ] Customer heterogeneity
- [ ] Flexibility (Variety)
- [ ] Waste
- [ ] Inflexibility

Question 6 (2 points)

Consider following performance metrics. In the context of process analysis, which of these metrics would be considered an appropriate **flow unit** for analyzing operational processes of a gas station?

Instructions: *You may select more than one answer. In case of multiple answers, points are distributed evenly across all answers. Points are assigned based on answers correctly selected minus wrong selections.*

- [ ] Sales dollars
- [ ] Number of customers served per day
- [ ] Number of employees working per day
- [ ] Number of gasoline pumps
- [ ] Square footage of the gas station

Bank visit

Table below shows time stamps for 10 customers who visited a particular branch of a local bank from 9:00 a.m. to 10:00 a.m. on a Monday.

Customer	Time In	Time Out
1	9:01	9:07
2	9:06	9:21
3	9:08	9:20
4	9:14	9:19
5	9:20	9:28
6	9:26	9:33
7	9:31	9:39
8	9:40	9:46
9	9:44	9:59
10	9:53	9:57

Question 7 (2 points)

Based on this data, what is the flow rate of customers (**in minutes**) from 9:00 a.m. to 10:00 a.m.?

Note: Round your final answer to 4 decimal places (i.e. use 0.1235 as opposed to 0.12345 or .1235)

Question 8 (2 points)

Based on this data, what is the flow time (**in minutes**) of customers from 9:00 a.m. to 10:00 a.m. ?

Note: Round your final answer to 1 decimal place (i.e. use 0.1 as opposed to 0.123 or .1)

Question 9 (2 points)

In which phase of the product life cyle is standardization an appropriate strategy ?

- Maturity
- Decline
- Introduction
- Growth

Question 10 (3 points)

Marissa owns and manages a french bakery in Gatineau. Last year, demand for her baguettes was **2,380** per month. This year, she forecasts that demand for her baguettes will grow by 25%.

Although the kitchen has no room for more ovens, one of her employees proposed that it was nonetheless possible to increase baking capacity if they arranged the dough buns differently on the oven grills. This would require more labour-hours, but it would allow the bakery to meet the 25% rise in demand without adding ovens.

Each employee works 160 hours per month. Last year, labour productivity was 2.344 baguettes per labour-hour.

To meet this year's demand, how many employees should Marissa **add to last year's workforce**, if she targets the same labour productivity ?

Notes: Round your final answer to **zero** decimals (i.e., round to the nearest integer and do not include any decimals).

Your Answer:

Answer

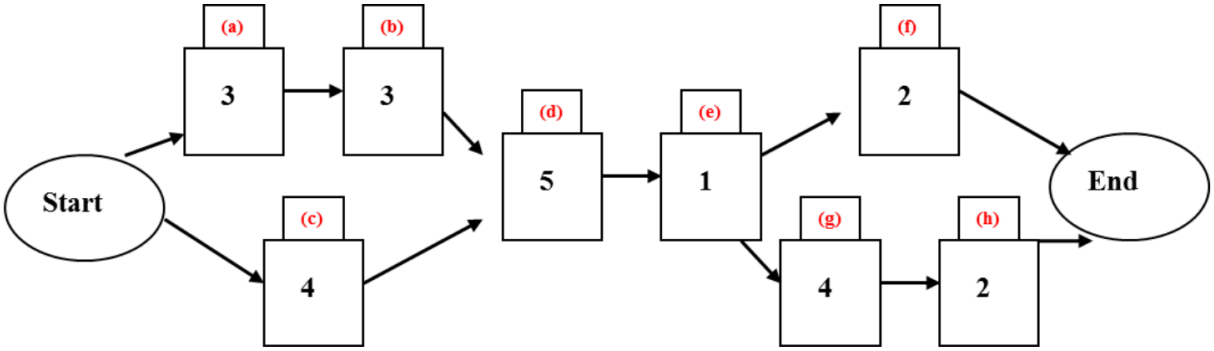
Question 11 (2 points)

The Ottawa Airport has 5 de-icing stations. Each plane uses a single station and each station takes 11.5 minutes to de-ice a plane. How many planes per hour can be de-iced at the Philadelphia Airport? **(Round the answer to 2 decimal places.)**

- 37.08 planes
- 20.42 planes
- 10.00 planes
- 26.09 planes

Question 12 (3 points)

The image below describes a process. The letters identify the tasks and the digits represent the number of minutes to complete them. Although they do not appear on the image, assume the presence of triangles between each task (i.e. work-in-process inventory may build up between each task).



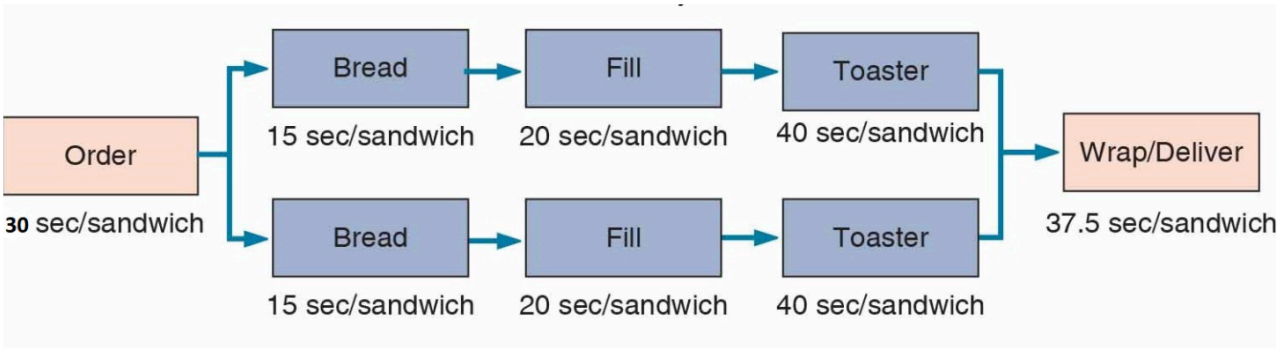
Wednesday, the process output rate averaged 9 units per hour. Compute the utilization for Wednesday.

Note: Round your final answer to **two** decimals. If your answer is 0.55, enter 0.55 (not 55%).

Your Answer:

Answer

Question 13 (2 points)



As illustrated above, Howard has two identical assembly lines in his sandwich shop. A customer first places an order (**30** seconds). The order is then sent to one of the two lines. One worker (per line) prepares the bread (**15** seconds) and another worker (per line) fills the bread and puts it on the toaster conveyor belt (**20** seconds). The toaster takes **40** seconds to heat one sandwich. Once toasted, another worker (for both lines) wraps the heated sandwich and delivers it to the customer (**37.5** seconds).

Assume each order is for one sandwich. Determine the shop's *theoretical* capacity in orders per hour. (i.e., the maximum number of orders they can complete in one hour).

- 96
- 90
- 48
- 24

Question 14 (2 points)

[The following information applies to this question and next question.]

Joe's Beer, Bait, & Tackle Co. is a small chain of fishing tackle stores in northern Minnesota. In 2009, the company's revenue was $4,300,000 and its cost of sales was $3,200,000. Assume 52 weeks and 365 days per year.

Joe keeps only 5.5 days-of-supply of inventory on average because much of his inventory is live bait and micro-brew beer, both of which have a short shelf life. What is his annual inventory turns? **(Round the answer to 2 decimal places.)**

- 98.12
- 34.64
- 76.76
- 66.36

Question 15 (2 points)

Given that he has 5.5-days-of-supply of inventory on average, how much inventory does Joe have on average? **(Round the answer to the nearest whole number.)**

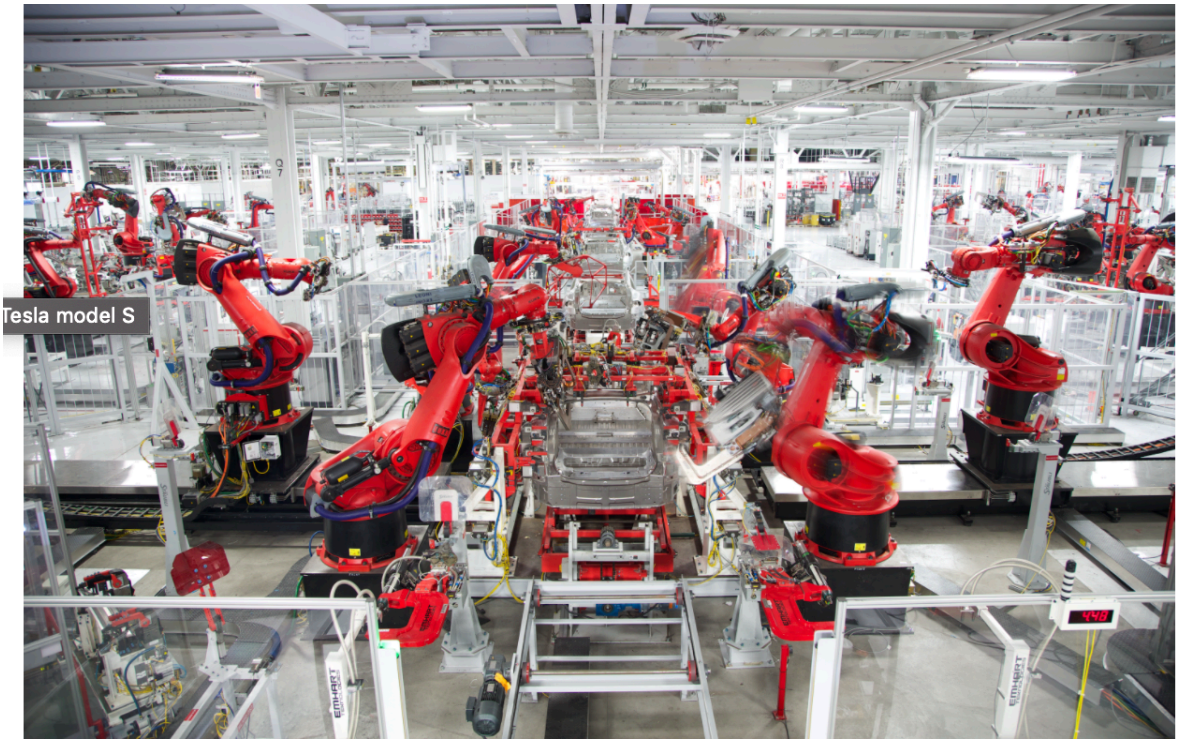
- ◯ $18,612
- ◯ $53,654
- ◯ $11,876
- ◯ $48,219

Question 16 (4 points)

Recall discussion of comparing different industries from class (i.e. Southwest vs. American airlines). We saw how each organization applies operational competencies that are aligned with their respective competitive attributes.

For an industry of your choice (that is not related to airlines or courier companies), find two companies that have different competitive attributes and detail how some of their operational competencies are aligned to their attributes.

Not to exceed 150 words. You must write the total number of words at the end of your text. Moreover, complete sentences, clarity, grammar and spelling count. Do not include web link*s.*



Production Process at Tesla

The Tesla model S is one of the most popular luxury cars of our time. It produced in Tesla's Freemont factory in California. The simplified production process for this car can be broken up into the following sub-processes.

Stamping: In the stamping process, coils of aluminum are unwound, cut into level pieces of sheet metal, and then inserted into stamping presses that shape the metal according to the geometry of the Tesla Model S. The presses can shape a sheet of metal in roughly 6 seconds.

Sub-assembly: The various pieces of metal are put together using a combination of joining techniques, including welding and adhesion. This creates the body of the car.

Paint: The body of the vehicle is then moved to the paint shop. After painting is completed, the body moves through a 350° oven to cure the paint, followed by a sanding operation that ensures a clean surface.

General assembly: After painting, the vehicle body is moved to the final assembly area. Here, assembly workers and assembly robots insert the various sub-assemblies, such as the wiring, the dash board, the power train and the motor, the battery pack, and the seats.

Quality testing: Before being shipped to the customer, the now-assembled car is tested for its quality. It is driven on a rolling road, a test station that is basically a treadmill for cars that mimics driving on real streets.

Overall, the process is equipped with 160 robots and 3000 employees. The process produces some 500 vehicles each week. It takes a car about 3–5 days to move from the beginning of the process to the end.

Questions

Answer each of the following questions in the text box provided below. Make sure to provide detailed answers and reasoning. Show all steps when calculations are involved. You can also insert images and files.

1) Imagine you could take a tour of the Tesla plant. To prepare for this tour, draw a simple process flow diagram of the operation. (Please describe all the assumptions you make, if you make any) (1 mark).

2) What is the cycle time of the process (assume two shifts of eight hours each and five days a week of operation)? (2 marks)

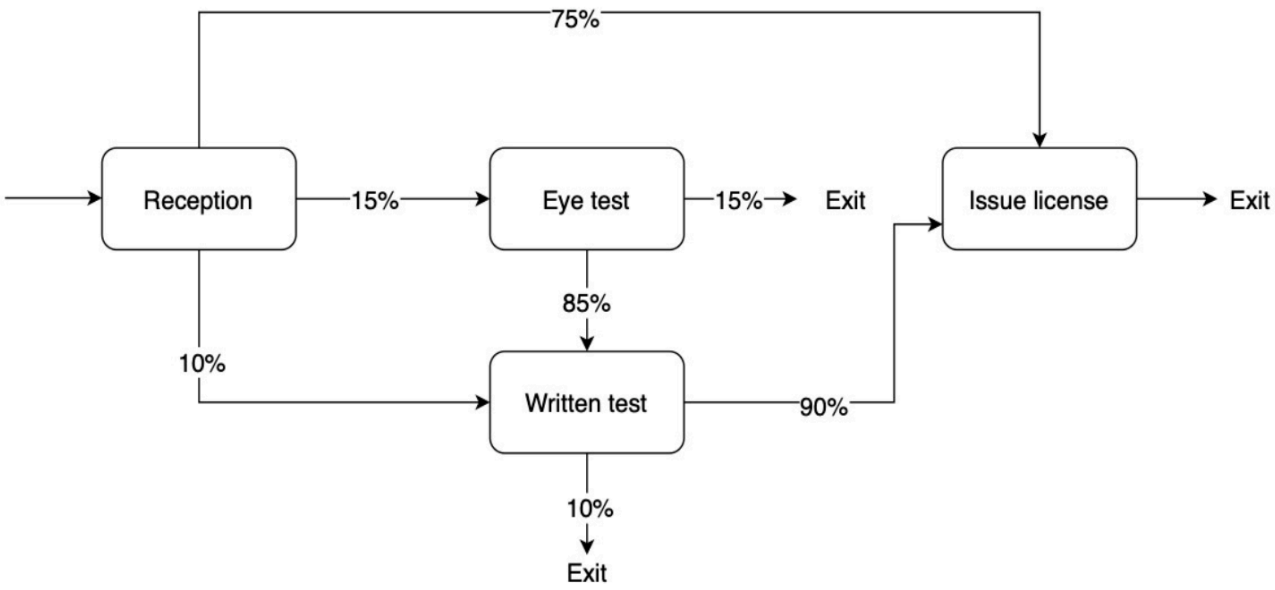
3) What is the flow time? (1 mark)

4) Where in the process do you expect to encounter inventory? (2 marks)

5) How many cars are you likely to encounter as work in progress inventory? (2 marks)

Question 18 (9 points)

The process flow diagram below is a high-level representation of the issuance and renewal process of licenses for vehicles at a local office of drivers and vehicle services. This particular office receives 110 customer requests per hour. The percentage in the diagram indicate the percentage of inflow and outflow of customers into and out of each stage. For instance, in the first stage the receptionist direct customers into one of the three directions shown in the diagram. 75% are directed to issue license which is where a new photo and license are done, and it is supported by 9 staff. 10% of customers requires to take a written test in one of the three available computers and 15% require taking an eye test which is staffed by one employee. The list of processing times and number of workers supporting each stage is provided in table below.


75%
Reception
15%
Eye test
15%
Exit
Issue license
Exit
85%
10%
Written test
90%
10%
Exit

Stage	Number of staff	Processing time (minutes)
Reception	1	0.4
Eye test	1	5
Written test	3	15
Issue license	9	6

Questions

Provide detailed answers for each of the following questions in the text box below. Make sure to provide detailed answers and reasoning. Show all steps involved in calculations.

a) Calculate implied utilization (%) of each stage. (8 marks)

b) Determine which stage is the bottleneck (1 mark)