

Final Exam – Module 1 Questions

Please submit your answers via the **Module 1 web form on the Coursera site.**

Smooth Chin Device Company

The Smooth Chin Device Company is a manufacturer of high-end electric razors. These razors are produced using a machine-paced process. For each razor, a tray with components enters the process at the beginning of a conveyor belt. The tray then passes through the six steps (consisting of various tasks) explained in the table below. Workers perform the assembly operations on the moving tray. The last step consists of an inspection of the then fully assembled razor. The activity times of the process are as follows:

Station	Tasks
A Preparation	1. Lay out chassis [12 sec] 2. Lay out screws [15 sec] 3. Lay out all other components [17 sec] Total time for A: 44 sec
B Assembly 1	4. Perform task AS1 [10 sec] 5. Perform task AS2 [10 sec] 6. Perform task AS3 [20 sec] Total time for B: 40 sec
C Assembly 2	7. Perform task AS4 [14 sec] 8. Perform task AS5 [16 sec] 9. Perform task AS6 [20 sec] 10. Perform task AS7 [5 sec] Total time for C: 55 sec
D Assembly 3	11. Perform task AS8 [30 sec] 12. Perform task AS9 [30 sec] Total time for D: 60 sec
E Assembly 4	13. Perform task AS10 [11 sec] 14. Perform task AS11 [19 sec] 15. Perform task AS12 [20 sec] Total time for E: 50 sec
F Inspection	16. Inspect electrics [20 sec] 17. Inspect aesthetics [20 sec] Total time for F: 40 sec

There are six workers, one at each of the six stations (A-F). They begin their workday at 8:00 am and work steadily until 4:00 pm. (They are replaced with other workers for breaks and lunches,

but the production is not slowed or stopped during these times.) Their hourly wage rate is \$25 per hour. For the first five questions, you can assume unlimited demand.

SC1. Which station is the bottleneck of the process?

- a. A
- b. B
- c. C
- d. D
- e. E
- f. F

SC2. What is the process capacity (you can ignore any start-up or empty system effects), in razors/hour?

SC3. What are the direct labor costs (you can ignore any start-up or empty system effects) associated with producing one razor, in dollars?

SC4. What is the average labor utilization (you can ignore any start-up or empty system effects) of the six workers? Please give your answer in decimal form (e.g. 0.5 for 50% utilization).

Industrial Baking Process

IB1. Strohrmann, a large-scale bakery in Pennsylvania, is laying out a new production process for their packaged bread, which they sell to several grocery chains. It takes 12 minutes to bake the bread. How large an oven is required so that the company is able to produce 4,000 units of bread per hour (give your answer in terms of the number of units that can be baked simultaneously)?

Save-A-Lot Retailers

The following table shows financial data (year 2009) for two US retailers: Save-A-Lot Retailers and Wally's Mart.

	Save-A-Lot	Wally's Mart
Inventories (\$MM)	5,743	40,694
Sales (net \$MM)	59,217	397,206
COGS (\$MM)	53,962	316,606

Assume that both companies have an average annual holding cost rate of 20% (i.e. it costs both retailers \$2 to hold an item for one entire year that they procured for \$10).

SL1. How many days, on average, does a product stay in Save-A-Lot's inventory before it is sold? Assume that stores operate 365 days a year.

SL2. How much lower, on average, is the inventory cost for Save-A-Lot compared to Wally's Mart of a household cleaner valued at \$50 COGS? Give your answer in terms of dollars. Assume that the unit cost of the household cleaner is the same for both companies and that the price and the inventory turns of an item are independent.

Great Valley Income Tax Advice

GV is a small accounting firm supporting wealthy individuals in their preparation of annual income tax statements. Every December, GV sends out a short survey to their customers, asking for the information required for preparing the tax statements. Based on 50 years of experience, GV categorizes their cases into the following groups:

- Group 1 (new customers, easy): 15 percent of cases
- Group 2 (new customers, complex): 5 percent of cases
- Group 3 (repeat customers, easy): 50 percent of cases
- Group 4 (repeat customers, complex): 30 percent of cases

Here, "easy" versus "complex" refers to the complexity of the customer's earning situation. In order to prepare the income tax statement, GV needs to complete the following set of activities. Processing times (and even which activities need to be carried out) depend on which group a tax statement falls into. All of the following processing times are expressed in minutes per income tax statement.

Group	Filing	Initial meeting	Preparation	Review by Senior accountant	Writing
1	20	30	120	20	50
2	40	90	300	60	80
3	20	No meeting	80	5	30
4	40	No meeting	200	30	60

The activities are carried out by the following three people:

- Administrative support person: filing and writing.
- Senior accountant (who is also the owner): initial meeting, review by senior accountant.
- Junior accountant: preparation.

Assume that all three people work eight hours per day and 20 days a month. For the following questions, assume the product mix as described above. Assume that there are 50

income tax statements arriving each month.

GV1. Which of the three persons is the bottleneck?

- a. Administrator
- b. Senior accountant
- c. Junior accountant

GV2. What is the (implied) utilization of the senior accountant?

GV3. What is the (implied) utilization of the junior accountant?

GV4. What is the (implied) utilization of the administrative support person?