SHOW ALL WORKS

Name: _____

1. (15 points) A company manufactures touring and mountain bikes in a variety of frame sizes, color and components combinations. Identical bicycles are produced in lots of 100, The projected demand, lot size and time standards are shown in the following table
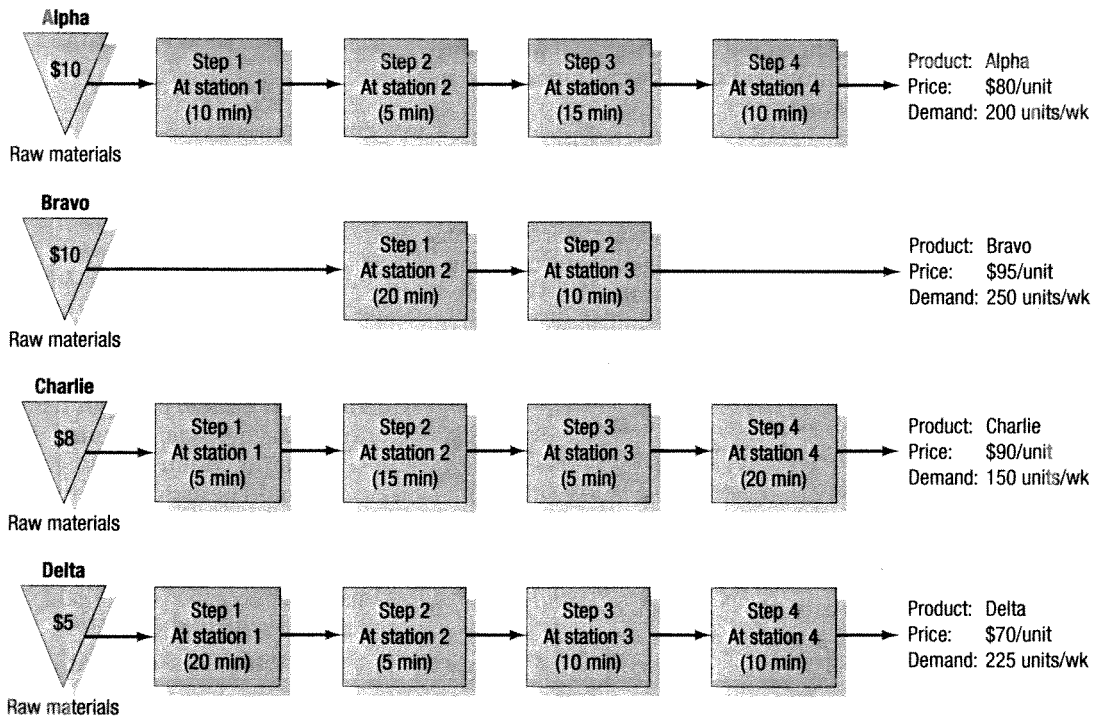
Item	Touring	Mountain
Demand forecast	5,000 units/year	10,000 units/year
Lot size	100 units	100 units
Standard processing time	.25 hour/unit	.50 hour/unit
Standard setup time	2 hours/lot	3 hours/lot

The shop currently works 8hr/day, 5 days/week and 50 weeks/year. It operates five stations each producing one bicycle in the time shown in the table. The shop maintains 15% capacity cushion. How many workstations are required next year to meet the expected demand?

2. (30 points) The table below contains data for the installations of new equipment in a manufacturing process at MY Corporation. Your company is responsible for installations project. Indirect costs are $15,000 and a penalty cost of $9,000 per week if the project is delayed beyond week 9. a) What is the shortest time duration for this project, regardless of cost? b) What is the minimum total cost associated with completing the project in 9 weeks,

Activity	Immediate Predecessor(s)	Normal Time (weeks)	Crash Time (weeks)	Normal Cost ($)	Crash Cost ($)
A	—	2	1	7,000	10,000
B	—	2	2	3,000	3,000
C	A	3	1	12,000	40,000
D	B	3	2	12,000	28,000
E	C	1	1	8,000	8,000
F	D, E	5	3	5,000	15,000
G	E	3	2	9,000	18,000

3. (30 points) CRGW four different models of desk lamps. The operations manager knows that total monthly demand exceeds the capacity available for the current production. The demand for next month is estimated to be 200 units of Alpha, 250 units of model Bravo, 150 units of model Charlie and 225 units for Delta. CRGW operates only one 8-hour shift per day and scheduled to work 20 days next month with no overtime. Each station requires 10% capacity cushion. What is the optimal product mix and overall profitability based on the traditional analysis method?

Alpha

$10 Raw materials → Step 1 At station 1 (10 min) → Step 2 At station 2 (5 min) → Step 3 At station 3 (15 min) → Step 4 At station 4 (10 min) →

Product: Alpha
Price: $80/unit
Demand: 200 units/wk

Bravo

$10 Raw materials → Step 1 At station 2 (20 min) → Step 2 At station 3 (10 min) →

Product: Bravo
Price: $95/unit
Demand: 250 units/wk

Charlie

$8 Raw materials → Step 1 At station 1 (5 min) → Step 2 At station 2 (15 min) → Step 3 At station 3 (5 min) → Step 4 At station 4 (20 min) →

Product: Charlie
Price: $90/unit
Demand: 150 units/wk

Delta

$5 Raw materials → Step 1 At station 1 (20 min) → Step 2 At station 2 (5 min) → Step 3 At station 3 (10 min) → Step 4 At station 4 (10 min) →

Product: Delta
Price: $70/unit
Demand: 225 units/wk

4. (25 points) One Hour Loan offers customized loans. Customers call a toll free number with a specific loan request, and obtain a response within an hour. One Hour Loan's business process includes five activities which must be conducted in the sequence described below. (The time required for each activity is shown in parenthesis):

- **Activity 1:** Answer customer call and record key information. (4 minutes)
- **Activity 2:** Gather and format the information (obtain credit scores, organize customer specific needs) for analysis   (5 minutes)
- **Activity 3:** Analyze the information: Check the credit worthiness, and decide loan amount and APR to offer. (7 minutes)
- **Activity 4:** Perform final checks on loan offer (2 minutes)
- **Activity 5:** Call customer back with the new loan offer and close. (4 minutes)

The whole process is conducted by three workers in a worker paced line. The assignment of tasks to workers is the following: W1 does Activity 1, W2 does Activities 2 and 3 and W3 does Activities 4 and 5.

1. What is the bottleneck of the process?
2. How much time will it take to process 100 loans? (Assume that the process starts with an empty production line)
3. What is the utilization of worker 3? (You can assume that the process operates at capacity and you do not have to consider any empty system effects)
4. What is the average labor utilization of the workers? Assume the process operates at its capacity and there are no empty system effects.
5. What are the direct labor costs for one loan application? Assume a wage rate of $20 per hour.