Please show all work:

1. A specialty coffeehouse sells Colombian coffee at a fairly steady rate of 65 pounds per **week**. The beans are purchased from a local supplier for $4 per pound. The coffeehouse estimates that it costs $50 in paperwork and labor to place an order for the coffee, and the annual holding cost is 20% of the purchasing price. (Use 52 weeks/year)
   1. What is the economic order quantity (EOQ) for Colombian coffee?
   2. What is the optimal number of orders per year?
   3. What is the optimal interval (**in weeks**) between the orders?
   4. **(BONUS – 5 points)** Assume that the coffeehouse’s current order policy is to buy the beans every 13 weeks. The manager says that the ordering cost of *S* = $50 is only a guess. Therefore, he insists on using the current policy. Find the range of *S* for which the EOQ you found in part a) would be preferable (in terms of a lower total replenishment and carrying costs) to the current policy of buying beans every 13 weeks.
2. A store has collected the following information on one of its products:

Demand = 6,760 units/year

Standard deviation of weekly demand = 18 units

Ordering costs = $40/order

Holding costs = $2/unit/year

Cycle-service level = 90%

Lead-time = 3 weeks

Number of weeks per year = 52 weeks

* 1. If the firm uses the continuous review system to control the inventory, what would be its order quantity and reorder point?
  2. Assume that the firm decided to change to the periodic review system to control the item’s inventory. The time between reviews, *P*, is calculated using the EOQ model. For the most recent review, an inventory clerk checked the inventory of this item and found 500 units. There were no scheduled receipts or backorders at the time. Determine how many units should the firm order.

1. The Marlin Company operates 50 weeks a year, and its cost of goods sold last year was $1,800,000. The firm carries six items in inventory: three raw materials, two work-in-process items, and one finished good. The following table shows the company’s last year’s average inventory levels for these items, along with their unit values.

|  |  |  |  |
| --- | --- | --- | --- |
| **Category** | **Part Number** | **Average Inventory**  **Units** | **Value per Unit** |
| Raw Materials | RM-1  RM-2  RM-3 | 1750  1500  1900 | $15  $20  $10 |
| Work-in-process | WIP-1  WIP-2 | 1500  1300 | $40  $50 |
| Finished Goods | FG-1 | 1000 | $120 |

* 1. What is their average aggregate inventory value?
  2. How many weeks of supply does the firm have?
  3. What was their inventory turnover last year?
  4. The turnover ratio is widely used because it is a common measure that links to the financial statements of the firm. Discuss the benefits and drawbacks of using this measure.

1. A manufacturer’s research and development center must expand by building a new facility. The search has been narrowed to five locations, all of which are acceptable to management. The assessment of these sites is being made on the basis of the five subjective location factors that follow. Management has agreed to use a five-point scale (Excellent = 5, and Poor = 1) to quantify and compare their subjective opinions about the relative goodness of the sites. The weight reflects the importance of each factor in the decision. Calculate the weighted score for each alternative. Which location would you recommend? Why?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Locations** | | | | |
| **Factor** | **Weight** | **A** | **B** | **C** | **D** | **E** |
| Labor climate | 30 | 4 | 2 | 4 | 5 | 3 |
| Proximity to markets | 25 | 4 | 3 | 5 | 4 | 3 |
| Quality of life | 20 | 1 | 3 | 4 | 3 | 2 |
| Proximity to suppliers | 15 | 2 | 5 | 2 | 3 | 3 |
| Taxes | 10 | 3 | 4 | 5 | 3 | 5 |

1. The Burdell Wheel and Tire Company assembles tires to wheel rims for use on cars during manufacture of vehicles by the automotive industry. Burdell wants to locate a low-cost supplier for the tires he uses in his assembly operation. The supplier will be selected based on total annual cost to supply Burdell’s needs. Burdell’s annual requirements are for 25,000 tires, and the company operates 250 days a year. The following data are available for two suppliers being considered.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Supplier** | **Shipping Quantity** | **Annual Shipping Costs** | **Price /unit** | **Annual Holding Cost/unit** | **Lead Time (days)** | **Annual Administrative Cost** |
| **Lexington Tire** | 2,000 | $18,000 | $41 | $8.20 | 7 | $14,000 |
| **Irmo Auto** | 1,500 | $22,000 | $40 | $8.00 | 5 | $18,000 |

Using the Total Cost Analysis for Supplier Selection, which supplier should Burdell choose? Provide details to justify your answer.

1. In a short paragraph, explain in what ways reverse logistics management is more difficult than the management of more typical supply chain flows.
2. Auto Data produces custom engineering testing equipment. The following six orders are currently in the design department:

|  |  |  |  |
| --- | --- | --- | --- |
| **Job** | **Time Since Arrival**  **(weeks ago)** | **Process Time**  **(weeks)** | **Due Date**  **(weeks from now)** |
| A | 5 | 2 | 7 |
| B | 6 | 8 | 16 |
| C | 7 | 4 | 4 |
| D | 4 | 10 | 17 |
| E | 2 | 5 | 15 |
| F | 3 | 12 | 18 |

1. Create a schedule using the first-come first-serve (FCFS) rule, calculating the average flow time and average weeks past due.
2. Create a schedule using the earliest due date (EDD) rule, calculating the average flow time and average weeks past due.
3. Which rule gives the best schedule based on average flow time and average weeks past due?

**8.**

* 1. Complete the inventory record below for an FOQ of 200 units.
  2. Discuss weaknesses of MRP. List at least three and explain each in a sentence or two.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item: A** |  |  |  |  |  | **Lot Size: 200 units** | | |
|  |  |  |  |  |  | **Lead Time: 2 weeks** | | |
|  | **Week** | | | | | | | |
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **Gross Requirements** | 120 | 150 | 110 | 150 | 130 | 160 | 130 | 150 |
| **Scheduled Receipts** | 200 | 200 |  |  |  |  |  |  |
| **Projected On-hand Inventory 50** |  |  |  |  |  |  |  |  |
| **Planned Receipts** |  |  |  |  |  |  |  |  |
| **Planned Order Releases** |  |  |  |  |  |  |  |  |