# HOMEWORK 1

**Question 1:**

The Chemco Company uses a highly toxic chemical in one of its manufacturing processes. It must have the product delivered by special cargo trucks designed for safe shipment of chemicals. As such, ordering (and delivery) costs are relatively high, at $3600 per order. The chemical product is packaged in one-gallon plastic containers. The cost of holding the chemical in storage is $50 per gallon per year. The annual demand for the chemical, which is constant over time, is 7000 gallons per year. The lead time from time of order placement until receipt is 10 days. The company operates 310 working days per year. Compute the optimal order quantity, total minimum inventory cost, and the reorder point.

**Question 2:**

The purchasing manager for the Pacific Steel Company must determine a policy for ordering coal to operate 12 converters. Each converter requires exactly five tons of coal per day to operate, and the firm operates 360 days per year. The purchasing manager has determined that the ordering cost is $80 per order, and the cost of holding coal is 20% of the dollar value of inventory held. The purchasing manager has negotiated a contract to obtain the coal for $12 per ton for the coming year.

a. Determine the optimal quantity of coal to receive in each order.
b. Determine the total inventory-related costs associated with the optimal ordering policy (do not include the cost of the coal).
c. If five days' lead time is required to receive an order of coal, how much coal should be on hand when an order is placed?

**Question 3:**

The 21,000-seat Air East Arena houses the local professional ice hockey, basketball, indoor soccer, and arena football teams as well as various trade shows, wrestling and boxing matches, tractor pulls, and circuses. Arena vending annually sells large quantities of soft drinks and beer in plastic cups with the name of the arena and the various team logos on them. The local container cup manufacturer that supplies the cups in boxes of 100 has offered arena management the following discount price schedule for cups:

| Order Quantity (Boxes) | Price per Box |
|---|---|
| 2,000 – 6,999 | $47 |
| 7,000 – 11,999 | 43 |
| 12,000 – 19,999 | 41 |
| 20,000+ | 38 |

The annual demand for cups is 2.3 million, the annual carrying cost per box of cups is $1.90, and ordering cost is $320. Determine the optimal order quantity and total annual inventory cost.

**Question 4:**

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County Hospital orders syringes from a hospital supply firm. The hospital expects to use 40,000 per year. The cost to order and have the syringes delivered is $800. The annual carrying cost is $1.90 per syringe because of security and theft. The hospital supply firm offers the following quantity discount pricing schedule:

| Quantity | Price |
|---|---|
| 0 – 9,999 | $3.40 |
| 10,000 – 19,999 | 3.20 |
| 20,000 – 29,999 | 3.00 |
| 30,000 – 39,999 | 2.80 |
| 40,000 – 49,999 | 2.60 |
| 50,000+ | 2.40 |

Determine the order size for the hospital.