

ISyE 3104
Supply Chain Models: Manufacturing & Warehousing-Fall 2004
Homework #8 – Due November 16, 2004

Show all your work for credit. Total: 40 Points

Question 1 (10 points)

TextilesRUs, a textile sizing and dyeing plant uses a continuous review system (Q,R) to manage its dye inventory. The ordering cost is \$200, and a gallon of purple dye costs \$5. Annual inventory holding cost is estimated at 20%. Expected annual demand is 10,000 gallons, and lead time demand is normally distributed with mean 400 and variance 900.

- a. (2 points) Find the lead time τ .
- b. (3 points) Find the reorder point for a type 1 service level of 90%, and the resulting safety stock.
- c. (5 points) Because of delivery convenience, the order quantity is set as 1000 gallons. If the estimated shortage cost per gallon is \$4, what is the reorder level that minimizes the total expected cost?

Question 2 (10 points)

In Question 1, suppose the estimated shortage cost per gallon is \$4.

- a. (3 points) If the company uses $R=400$, what is the optimal order quantity Q^* which minimizes the total cost?
- b. (1 points) Find the percentage of time with shortages, assuming policy $(R=400, Q^*)$.
- c. (6 points) What is the optimal (Q,R) policy? What is the cost of this policy?

Question 3 (10 points)

In Question 1, is TextilesRUs wants to achieve a 99% Type 2 service level, what is the optimal (Q,R) policy? What is the imputed shortage cost that corresponds to this policy?

Question 4 (10 points)

Two of the basic assumptions of MRP are that:

1. We have a production line with a fixed lead time; any amount released to one stage will be available to the next stage after the lead time.
2. The BOM explosion in each period is done based on the forecasted demand over the forecast horizon; these forecasts are updated at the end of each period.

Discuss what problems each of these assumptions may cause in the production system, and suggest remedies.