

Homework 2

Problem 1 (12 points) A company sells a product with a weekly demand of 50 units. Every time the company orders from a supplier, it costs the company \$30. The *weekly* holding cost per unit is \$0.2. The company orders the product from a supplier with a lead time of 2 weeks.

1. (2 points) What is the optimal batch size (Q) and reorder point (R)?
2. (2 points) Under the (Q,R) policy in part 1, what are the weekly ordering cost and holding cost?

The company discovers that the *weekly* demand has some uncertainty and is normally distributed with mean 50 and standard deviation 7. Answer the following questions.

3. (2 points) What is the level of safety stock necessary to guarantee that the stock-out probability is at most 1%?
4. (2 points) What is the new (Q,R) policy?
5. (4 points) What are the average weekly ordering cost and holding costs now? Compare with the costs in part 2, how much do your costs go up?

Problem 2 (18 points) MicroApple is a manufacturer of personal computers. It currently manufactures a single model — the MacinDOS — whose weekly demand is normally distributed with an average of 200 and standard deviation of 60. MicroApple orders the disk drives for the MacinDOS (1 per computer) from an outside supplier at a cost of \$30 each. The administrative costs for placing an order total \$30. The annual holding cost is \$6 per drive. If MicroApple stocks out of disk drives, production is halted. Because of the seriousness of stock-outs, management wants to keep enough safety stock to maintain a 99% service level.

The supplier now is offering two shipping options. With option 1, the lead time would be 2 days. For each order, the shipping cost charged to MicroApple would be \$100, regardless of how many drives are shipped. With option 2, the lead time would be 1 day, but for each order, the expedited shipping cost charged to MicroApple would be \$200, regardless of how many drives are shipped. Assume that the manufacturing facility works 7 days a week (365 days a year). There are 52 weeks in a year.

1. (4 points) For each option, what is the optimal batch size to use?
2. (4 points) For each option, how much safety stock should MicroApple use?

3. (6 points) For each option, how much does MicroApple pay for purchasing, ordering, and holding inventory on average each year?
4. (2 points) Based on your answers in parts 1—4, which option should MicroApple select and what is the associated (Q, R) policy?
5. (2 points) Using the shipping option and policy in part 5, on average, how long does a disk driver stay in MicroApple's warehouse before being used to produce MacinDOS? (Hint: use Little's law.)