

PRACTICE QUESTIONS FOR MIDTERM #1

Note: The problems on the exam may not have the same format as these questions. Instead, the questions are designed to help you study most of the topics to be covered on the exam. This set of questions is longer than the actual exam will be.

1. A new computer supply store offers the following all units discounted price schedule for boxes of rewritable CDs (CD-Rs).

<u>Quantity</u>	<u>Price per box</u>
49 or less	\$ 5
50 or more	\$ 4

There is also a \$20.00 shipping and handling charge per order. XYZ Corporation uses 400 boxes of CD-Rs per year and has an annual inventory holding cost rate of 30%.

(a) How much should XYZ order at a time?

(b) After XYZ and several other customers place their first orders, the computer supply store realizes that it is inconvenient to handle small orders. To encourage the customers to make larger orders, it changes its price schedule. Under the new price schedule, the unit price up to 100 boxes is \$5 per box and there is a minimum order quantity of 50 boxes. An incremental discount price of \$3 per box applies for all quantities above 100 boxes. How much should XYZ order under the new price schedule?

2. A magazine vendor in a small town in Montana sells a particular foreign-language news magazine that is published monthly. The vendor has observed that demand for the magazine has been 3, 4, 5, or 6 with equal probability. The selling price of the magazine is \$6, and the vendor purchases the magazine for \$3. Leftover magazines are donated to the library, and the vendor gets a tax reduction of \$1 for each donated magazine.

(a) How many units of this magazine should the vendor buy each month?

(b) How would your answer change if the item were not perishable?

(c) The publisher is trying to discourage small orders, and is planning to impose a \$10 service charge per order. Should the vendor continue to offer this magazine? Why or why not?

3. A new IE graduate has been given the task of determining the best production quantity for a new product that will be produced on a new machine. Unfortunately, the manufacturing engineers still do not know what the production rate will be.

The Industrial Engineer decides to use the EOQ as the production quantity until the production rate of the machine is better understood. Several months later, it has been determined that the demand rate is approximately 80% of the production rate.

The Industrial Engineer is now trying to justify to his boss why he used the EOQ. What was the percentage penalty associated with using the EOQ versus the optimal solution? Your answer can be expressed as a fraction of the total annual setup and holding cost of the optimal solution.

(Hint: The formula for sensitivity analysis for the economic production quantity is the same as that for the economic order quantity.)

4. A large personal computer manufacturing company uses approximately 250,000 units of a particular cardboard box each year. These boxes are for a particular type of computer whose production rate per day is normally distributed with a mean of 1,000 and a standard deviation of 200. The company has a 250-day work year.

The inventory of boxes is monitored continuously by the packaging department. Each box costs \$2.00, and 5000 boxes can be shipped in one truck at a cost of \$200. ***The company has decided to use a full-truckload shipment policy for the boxes.*** The delivery time for these boxes is one working day. The boxes are very bulky and the warehouse is short on space, so the company uses an annual inventory holding cost rate of 50%. There is only enough room in the warehouse for 8000 boxes of this type.

(a) The company would like to package each computer immediately after it finishes the final quality control tests. If there is a shortage of boxes, shipment of several orders may be delayed. The sales manager thinks that she can tolerate such a situation in 1% of the order cycles. What inventory control policy would be consistent with her thoughts?

(b) The warehouse manager is concerned about the security of unpackaged computers. He has observed that 2% of the completed but unpackaged computers are stolen, and the computer costs \$500 to manufacture. If this were the primary concern, what inventory control policy should be used?

(c) The manager of the packaging line thinks that it would be sufficient to ensure that 98% of the computers could be packaged immediately after completing final testing. What inventory control policy does this imply?

5. A local warehouse (discount) store sells only one brand of motor oil and sells it by the case (12 bottles in a case). One case costs \$15.00 and can be sold for \$25.00 (on the average). The store uses an annual inventory holding cost rate of 24%. The store has been selling 1000 cases per month. It costs \$100 and takes one week for an order to be shipped from the manufacturer. The standard deviation of demand during a one-week period is 50 units.

(a) Recommend an ordering policy and justify it. Compute the associated control parameters.

(b) What are the fill-rate (β) and the probability of not stocking out during the lead time (α) for your policy?

(c) If you were to use an (S,T) policy, what would be your recommended control parameters?

6. A bottling plant in a location where the weather is warm year-round produces its four most popular beverages on one production line. The beverages are:

Flavor	Annual demand (cases—24 cans)
Cola	250,000
Diet cola	300,000
Lemon-lime	150,000
Diet lemon-lime.	100,000

The plant can produce 1,000,000 cases per year operating one shift (8 hours) per day, 250 days per year. The total production cost of a case is \$2.00, and the plant sells the product to grocery stores for \$3.00 per case. The plant uses an inventory holding cost rate of 80% because storage space is tight.

Each time a flavor change takes place, about \$100 worth of raw materials is lost and it takes about 2 hours to perform the line changeover.

The plant manager thinks that it's important to keep the employees and equipment busy so she uses a production schedule in which all products are produced every week. If everything works as planned, shipments can be made on time. But when there are equipment breakdowns, overtime is usually necessary.

What do you think of the current production plan? Is a better option available? If so, what would the schedule look like? Explain, using systematic analysis to support your opinion.

7. TRUE/FALSE--EXPLAIN YOUR ANSWER

- _____ To find the expected number of units short, we should subtract the average demand from the initial inventory.
- _____ Trucking companies often charge "per pound" up to a specified weight, and a fixed dollar amount (independent of the weight) for larger shipments. This is an all-units discounted price schedule.
- _____ Expensive items are usually classified as C items in an ABC analysis.