

Problem 15-3

A police station had to deploy a police officer for an emergency multiple times in the last four evenings. The table below shows the number of emergencies each evening.

Weekday	Number of calls each day
Monday	7
Tuesday	4
Wednesday	8
Thursday	11

What would be their forecast for the emergencies on Friday using a two-day moving average approach?

What would be their forecast for the emergencies on Wednesday using a two-day moving average approach?

Problem 10-2

Suppose a retailer's annual inventory turns are 7.5.

What are its days-of-supply of inventory? (Assume 365 days per year.)

Problem 12-4

Bruno Fruscalzo decided to start a small production facility in Sydney to sell gelato to the local restaurants. His local milk supplier charges \$0.50 per kg of milk plus a \$20 delivery fee (the \$20 fee is independent of the amount ordered). Bruno's holding cost is \$0.03 per kg per month. He needs 9000 kg of milk per month.

- a. Suppose Bruno orders 9,000 kg each time. What is his average inventory (in kg)?

(Round your answer to 1 decimal place.)

- b. Suppose Bruno orders 7,000 kg each time. How many orders does he place with his supplier each year?
- c. How many kg should Bruno order from his supplier with each order to minimize the sum of the ordering and holding costs?
- d. If Bruno's storage vessel can hold only 3,000 kg of milk, what would be Bruno's annual ordering and holding costs?

Problem 12-4 continued

Bruno Fruscalzo decided to start a small production facility in Sydney to sell gelato to the local restaurants. His local milk supplier charges \$0.50 per kg of milk plus a \$20 delivery fee (the \$20 fee is independent of the amount ordered). Bruno's holding cost is \$0.03 per kg per month. He needs 9000 kg of milk per month.

- e. If Bruno's storage vessel can hold only 6,000 kg of milk, what would be Bruno's annual ordering and holding costs?

Bruno's supplier's truck can carry 20,000 kg of milk. The supplier does not want to deliver to more than three customers with each truck. Thus, the supplier

- f. requires a minimum order quantity of 6,500 kg. If Bruno orders the minimum amount, what would be the sum of his annual ordering and holding costs? Assume he has a storage vessel large enough to hold 6,500 kg.

(Round your answer to 3 decimal places.)

- g. Bruno's supplier offers a 5 percent discount when a customer orders a full truck, which is 20,000 kg. Assume Bruno can store that quantity and the product will not spoil. If Bruno orders a full truck, what would be the inventory holding and ordering cost incurred per kg of milk?

Soda/Pop Sales

Suppose a retailer turns its inventory of soda 50 times per year. On average, it has 400 bottles of soda on its shelves.

What is the retailer's average daily sales rate? (Assume 365 days per year.)

Inventory Holding Cost

Most companies assess their inventory holding costs as a percentage of the cost to purchase an item. We call this percentage the **holding cost percentage**

- For example: If a dress costs \$50 and the firm assigns a holding cost percentage of 35%, what is the cost to hold a dress in inventory for the entire year?
- The retailer's annual turns are 3. How much inventory holding cost should be assigned to each dress sold?

Example: 12-2



Sarah's Organic Soap Company makes organic liquid soap. One of the raw materials for her soaps is organic palm oil. She needs 1000 kg of palm oil per day, on average. The supplier charges a \$60 delivery fee per order (which is independent of the order size) and \$4.75 per kg. Sarah's annual holding cost is 25 percent. Assume she operates and sells five days per week, 52 weeks per year.

- a. If Sarah wants to minimize her annual ordering and inventory holding costs, how much palm oil should she purchase with each order (in kg)?
- b. If Sarah orders 4,000 kg with each order, what would be the annual sum of the ordering and holding costs?
- c. If Sarah orders 8,000 kg with each order, what would be the sum of the ordering and holding costs per kg sold?

Example: 12-3



Joe Birra needs to purchase malt for his microbrewery production. His supplier charges \$35 per delivery (no matter how much is delivered) and \$1.20 per gallon. Joe's annual holding cost per unit is 35 percent of the price per gallon. Joe uses 250 gallons of malt per week.

- a. Suppose Joe orders 1,000 gallons each time. What is his average inventory (in gal)?

(Round your answer to 2 decimal places.)

- b. Suppose Joe orders 1,500 gallons each time. How many orders does he place with his supplier each year?

- c. How many gallons should Joe order from his supplier with each order to minimize the sum of the ordering and holding costs?

(Round your answer to 3 decimal places.)

- d. Suppose Joe orders 2,500 gallons each time he places an order with the supplier. What is the sum of the ordering and holding costs per gallon?

Example: 12-3 cont



Joe Birra needs to purchase malt for his microbrewery production. His supplier charges \$35 per delivery (no matter how much is delivered) and \$1.20 per gallon. Joe's annual holding cost per unit is 35 percent of the price per gallon. Joe uses 250 gallons of malt per week.

e. Suppose Joe orders the quantity from part (c) that minimizes the sum of the ordering and holding costs each time he places an order with the supplier. What is the annual cost of the EOQ expressed as a percentage of the annual purchase cost?

f. If Joe's supplier only accepts orders that are an integer multiple of 1,000 gallons, how much should Joe order to minimize ordering and holding costs per gallon?

g. Joe's supplier offers a 3 percent discount if Joe is willing to purchase 8,000 gallons or more. What would Joe's total annual cost (purchasing, ordering, and holding) be if he were to take advantage of the discount?

Example 13-1a

Dan McClure owns a thriving independent bookstore in artsy New Hope, Pennsylvania. He must decide how many copies to order of a new book, *Power and Self-Destruction*, an exposé on a famous politician's lurid affairs. Interest in the book will be intense at first and then fizzle quickly as attention turns to other celebrities. The book's retail price is \$20, and the wholesale price is \$12. The publisher will buy back the retailer's leftover copies at a full refund, but McClure Books incurs \$4 in shipping and handling costs for each book returned to the publisher. Dan believes his demand forecast can be represented by a normal distribution with a mean of 200 and a standard deviation of 80. Use [Table 13.4](#)

Dan will consider this book to be a blockbuster for him if it sells more than 400

- a. units. What is the probability that *Power and Self-Destruction* will be a blockbuster?

(Round your answer to 4 decimal places.)

- b. Dan considers a book a "dog" if it sells less than 50 percent of his mean forecast. What is the probability this expose is a "dog"? Use Excel.

(Round your answer to 4 decimal places.)

- c. What is the probability that demand for this book will be within 20 percent of the mean forecast?

- d. What order quantity maximizes Dan's expected profit?

Example 13-1b

Dan McClure owns a thriving independent bookstore in artsy New Hope, Pennsylvania. He must decide how many copies to order of a new book, *Power and Self-Destruction*, an exposé on a famous politician's lurid affairs. Interest in the book will be intense at first and then fizzle quickly as attention turns to other celebrities. The book's retail price is \$20, and the wholesale price is \$12. The publisher will buy back the retailer's leftover copies at a full refund, but McClure Books incurs \$4 in shipping and handling costs for each book returned to the publisher. Dan believes his demand forecast can be represented by a normal distribution with a mean of 200 and a standard deviation of 80. Use [Table 13.4](#)

(Round your answer to 2 decimal places.)

If Dan orders the quantity needed to achieve a 95 percent in-stock probability,

- e. what is the probability that some customer won't be able to purchase a copy of the book?

(Round to the nearest whole number.)

- f. Suppose Dan orders 300 copies of the book. What is Dan's expected leftover inventory?

(Round to the nearest whole number.)

- g. Suppose Dan orders 300 copies of the book. What are Dan's expected sales?

(Round to the nearest whole number.)

- h. Suppose Dan orders 300 copies of the book. What is Dan's expected profit?

- i. How many books should Dan order if he wants to achieve a 95 percent in-stock probability?

Example From Homework

Weekly demand for DVD-Rs at a retailer is normally distributed with a mean of 1,000 boxes and a standard deviation of 150. Currently, the store places orders to the supplier, with a reorder point of 4,200 boxes. The order quantity to the supplier is fixed at 5,000 boxes. Replenishment lead time is 4 weeks, fixed order cost per order is \$100, each box costs the retailer \$10, and the inventory holding cost is 25% per year.

- a) Given the reorder point value of 4,200 boxes, calculate the safety stock currently in place at the retailer?
- b) If the retailer wants to achieve a 99% service level (use the z-value with one decimal, as in Table 13.4 on page 405 of the textbook, or $z=2.4$), what should be the safety stock value?
- c) With a safety stock of 300 boxes, what is the approximate service level (round to two decimals)?

Example: 14-5

You are the owner of Hotspices.com, an online retailer of hip, exotic, and hard-to-find spices. Consider your inventory of saffron, a spice (generally) worth more by weight than gold. You order saffron from an overseas supplier with a shipping lead time of four weeks. Average weekly demand is normally distributed with a mean of 40 ounces and a standard deviation of 30 ounces.

- a) What is the coefficient of variation?
- b) To achieve a 0.95 in-stock probability what level of Safety Stock should you choose?
- c) What is the ROP?