[a] 17. Elaine makes delicious cupcakes that she mails to customers across the country. Her cupcakes are so delicious that she has a great degree of pricing power. Elaine's customers have identical demands for cupcakes. A representative customer's demand is shown in the diagram on the right. Elaine can make a cupcake for a constant marginal and average total cost of $0.50.
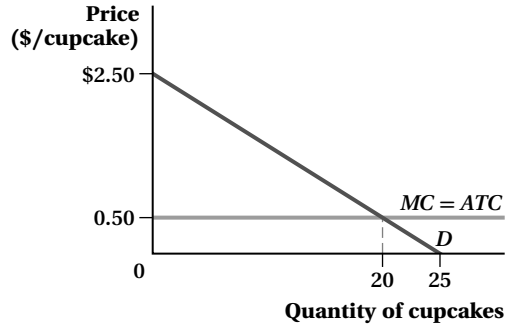
a. If Elaine is an ordinary monopolist, what price should she charge for cupcakes? How many will each customer order? How much profit will Elaine earn? How much consumer surplus will the buyer get?

b. Suppose that Elaine decides to offer a quantity discount according to the following terms: The first 10 cupcakes can be bought for $1.50 each; any cupcake over 10 will be offered at a discounted price. What discount price will maximize Elaine's profit from this pricing scheme? (*Hint*: Draw a new demand curve for Elaine's customers' demand, but since her customers have already purchased 10, begin your demand curve at the 11th unit. Alternatively, shift the vertical axis to the right by 10 units.)

c. How many cupcakes will customers order at full price? How many at the discounted price?

d. What will Elaine's profit be? How does this scheme compare to the profit she earned as an ordinary monopolist?

e. Suppose that Elaine gets super-greedy and decides to implement a three-tiered pricing system. What three prices should she choose to maximize her profit? At what quantities will the price points change? What will her profit be?

f. Suppose Elaine decides to charge $2.40 for the first cupcake, $2.30 for the second, and so on. How many cupcakes will she sell, and what will her profit be?

g. What happens to consumer surplus as Elaine adds more price points? Where does it go?

h. Suppose that Elaine decides to establish an optimal block pricing structure with two different prices for cupcakes. For this case, use calculus to identify the two prices and quantities that Elaine should use to maximize producer surplus. Suppose that fractional units are okay.

i. If Elaine establishes a block pricing structure with two different prices for cupcakes and maximizes producer surplus, use calculus to identify consumer surplus, producer surplus, and total surplus.