

HW 28

1. You are the manager of Copies Are Us. The only other copy store in town, the Carbon Copy, recently got bids on adding a color copier. You must decide whether to obtain a color copier, but you can base decision on what your rival does. If your rival adds a color copier and you don't, you expect your profits to fall by \$1,000 per week and its profits to rise by \$1,500 per week. Conversely, if you add the color copier and your rival does not, your profits will increase by \$1,500 per week and your rival's profits will fall by \$1,000 per week. However, if you both do the same thing (add color copiers or not), you each expect profits to stay at their current level. Show the extensive form of this game, and find the Nash equilibrium (or equilibria). Is there a subgame perfect equilibrium?

Answer:

The extensive form game is shown in Figure 10-11. The subgame perfect Nash equilibrium is for both of you to add color copiers, to earn zero profits.

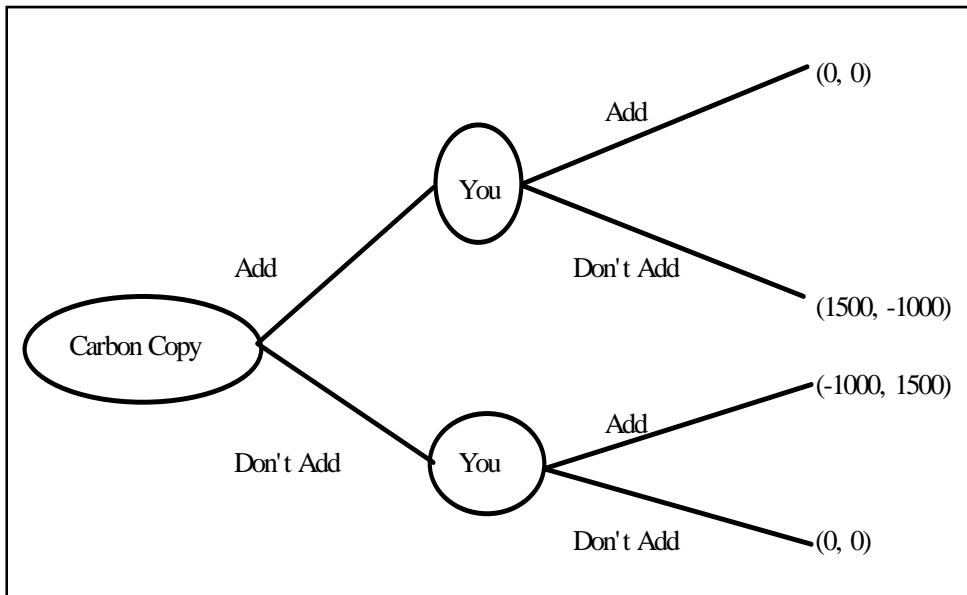


Figure 10-11

2. You are the manager of the ABC novelty store, and your only competitor is the XYZ novelty store. You are both trying to decide on which magic tricks and party favors to carry in stock. The product mixes available to both of you are low, medium, and high in variety. Your expected earnings in this market are shown in the following table.

		Firm XYZ		
		Low	Medium	High
Firm ABC	Low	100, 100	150, 200	200, 300
	Medium	200, 75	125, 150	225, 195
	High	300, 200	100, 225	150, 250

- a. Find the Nash equilibrium (or equilibria) for a simultaneous-move, one-shot play of this game.
- b. What outcome would you expect in this one-shot game? Why?

Answer:

- a. The only Nash equilibrium is that Firm ABC chooses medium while Firm XYZ chooses high.
 - b. In a one-shot game, we expect the two firms to choose medium (Firm ABC) and high (Firm XYZ) to obtain 225 and 195 units of profit, respectively.
3. You are the CEO of Comchip, a firm that sells specialized computers. Each of the firm's computers contain a unique chip that is produced at Comchip's west coast plant at a cost of $C_w(Q_c) = Q_c^2$. Once produced, the chips are shipped exclusively to the firm's east coast plant. There, the computers are assembled, boxed, and shipped to the market at a cost of $C_e(Q) = 200Q$. An economic consultant recently estimated the demand for Comchip's computers and found it to be $P = 5,000 - Q$. Determine Comchip's optimal output and price for computers, and explain how it can induce plant managers to produce the required number of chips and computers.

Answer:

Since $Q_c = Q$, the number of chips that maximizes overall firm profits is determined by setting the $NMR_w = MC_w$:

$$NMR_w = 5,000 - 2Q_c - 200 = 2Q_c.$$

Solving for Q_c , the west-coast plant should produce $Q_c = 1,200$ chips, and (since $Q = Q_c$) the east coast plant should produce 1,200 computers. The optimal price for the firm's computers, therefore, is $P = 5,000 - 1,200 = \$3,800$. The firm can achieve this outcome by setting the optimal transfer price at the west coast plant's marginal cost of producing 1,200 chips, or $P_T = \$2,400$, and by then providing east and west coast managers an incentive to maximize their plant's profits given this transfer price.

4. Suppose that JVC is trying to decide how to price a new stereo system composed of a receiver, CD player, and speakers. The company's economists have estimated that two different groups will purchase these products: students and club owners. The economists' analysis suggests that the total market for its brand of stereos consists of 10,000 students

and 50,000 club owners. In addition, it is estimated that the maximum amount each group will pay for each stereo component is as follows:

<i>Group</i>	<i>Receiver</i>	<i>CD Player</i>	<i>Speakers</i>
Students	\$250	\$150	\$100
Club owners	\$200	\$75	\$250

JVC's objective is to maximize revenues, and it is considering three strategies to price its stereo components: (1) a standard strategy whereby it prices each stereo component separately; (2) perfect price discrimination; or (3) bundling the three components together and selling only bundles containing the receiver, CD player, and speakers.

- If JVC uses a standard pricing strategy, what price should it charge for the receiver, for the CD player, and for the speakers to maximize revenues? What are the revenues they will earn through this strategy?
- Suppose JVC adopts a first-degree price discrimination policy. What prices should it charge to maximize revenues? What are JVC's revenues using this strategy?
- Suppose that JVC markets the receiver, CD player, and speakers together. That is, it uses a commodity-bundle strategy such that the products are sold as one item. What price should JVC charge to maximize revenues? How much will it earn?

Answer:

- Price receivers at \$200, CD players at \$75, and speakers at \$250. Revenues from receiver sales will thus be $\$200(60,000) = \12 million, revenues from CD player sales will be $\$75(0,000) = \4.5 million, and speaker sales will be $\$250(50,000) = \12.5 million.
 - Charge each group the maximum price they will pay for each item. Students will pay \$250, \$150, and \$100 for a receiver, CD player, and Speakers, respectively. Club owners will pay \$200, \$75, and \$250, respectively. Total revenues from this strategy are: $\$5$ million + $\$26.25$ million = $\$31.25$ million.
 - Using a commodity bundling strategy, JVC would maximize revenues when it charges \$500 for a bundle containing all three components. Its' revenue would be \$30 million ($60,000 \times \500).
5. You run a golf course at a tourist resort. At your resort, there are two distinct groups of players. One group owns property at the resort and resides there most of the year. On average, each of these consumers has a monthly inverse demand for golf services of $P = 100 - .5Q$. The other group visits for one week at a time and has a total weekly demand curve of $P = 40 - .1Q$. What pricing strategy will maximize your profits?

Answer:

Suppose the marginal cost to the golf course of each visit is zero. The most a customer is willing to pay is his or her total valuation of the quantity of goods consumed. The total valuation is measured by the area under the inverse demand curve and the horizontal axis for that range of quantity. Hence, the most a property owner is willing to pay is $.5(\$100)(200) = \$10,000$ per month. The most a tourist is willing to pay is $.5(\$40)(400) = \$8,000$ per week. Hence, your optimal pricing policy is: charge property owners a

membership fee of \$10,000 per month per person; charge tourists a membership fee of \$8,000 per week per person. And then let each golfer play golf for free.

6. As manager of the only video store in town, you have noticed that on Thursday through Sunday the demand for renting your movies is much higher than it is on Monday through Wednesday. You therefore conducted a study that revealed two different market demand curves. On weekends, your inverse demand curve is $P = 10 - .001Q$; on weekdays, it is $P = 5 - .01Q$. The marginal cost of renting a movie is \$.50 (50 cents). Your average customer never rents more than one movie at a time. What pricing strategy will maximize your profits?

Answer:

This manager can maximize profits by engaging in two part pricing. Since demand differs on weekends and weekdays, the manager can adopt two different schemes. On weekends, the market inverse demand function is $P = 10 - .001Q$. Since marginal cost is \$0.5, setting $P = MC$ leads to a total 9,500 videos sold on the weekend. Total consumer surplus in the market is $.5(10 - .5)(9500) = \$45,125$, or \$4.75 for each of the 9500 customers. The optimal policy, therefore, is to charge a fixed fee of \$4.75 to enter the store on a weekend, and then rent videos at the bargain price of \$0.50 each once a consumer enters the store. Since the average consumer buys one video, this amounts to a price of \$5.25 per video.

A similar analysis reveals that, on weekdays, the entry fee should be \$2.25, with videos still priced at \$0.50 each (which amounts to \$2.75 per video if each consumer buys exactly one).

7. You have just been hired as manager of a new health spa in Retirement Village, Florida. The owner has commissioned a market study that estimates the average customer's monthly demand curve for visiting the health spa to be $Q^d = 50 - .25P$. The cost of operating is $C(Q) = 3Q$, where Q is the number of visits. The owner has been charging a \$20 per-month membership fee and a \$5 per-visit fee. Part of your salary is 10 percent of the monthly profits. Suggest a pricing strategy that will increase your salary.

Answer:

With the original pricing scheme, the number of visits per customer is $Q^d = 50 - 0.25(50) = 48.75$. Hence, profit from each customer is $\$20 + (\$5 - \$3)(48.75) = \117.5 , and the compensation to the manager is 10% of \$117.5, or \$11.75 per customer. However, you may charge a price of \$3 (equal to marginal cost) and charge a membership fee equaling the consumer's surplus. This gives the number of visits per customer equal to $Q^d = 50 - 0.25(3) = 50 - 0.75 = 49.25$. The consumer surplus is $.5(\$200 - \$3)(49.25) = \$4,851.13$. Hence, the membership fee should be as high as \$4,851.13 per person. Your compensation will be $.10(\$4,851.13) = \485.11 per customer.