Review, Second Quiz: Solutions
Managerial Economics: Eco 685

Question 1

A large firms has a large customer base. Therefore, cutting prices can result in large reductions in profit. Conversely, if the large firm keeps prices high, the large firm will lose some customers to a low cost rival. But most customers will remain loyal to the large firm, and so the large firm generally loses less profits by ignoring the smaller rival as opposed to cutting prices.

Knowing this, a small rival can cut prices and increase market share without fear of retaliation... as long as the rival stays small enough so that most customers continue to stay with the large firm, that is, as long as the small firm is not a big threat.

Question 2

One advantage is theft prevention since the cash register must be used to make change, creating a paper trail. A disadvantage is that queues become longer (or more cashiers are needed) which explains why arenas do not use 99 cent pricing.

Question 3

a. The cost plus price considers only the parts and raw materials so:

$$P = \$20,000 \cdot 1.1 = \$22,000 \tag{1}$$

b. The company makes an investment of \$24,000 in each car. Thus if the firm wants a return of 10% (I'll assume the car is sold at the end of the period) then:

$$\$24,000 = \frac{P}{1+.1} \quad \rightarrow \quad P = \$26,400 \tag{2}$$

c. The optimal price is:

$$P = \frac{1}{\frac{1}{e_p}+1} MC = \frac{1}{\frac{1}{-6}+1} \$24,000 = \$24,000 \cdot \frac{6}{5} = \$28,800 \tag{3}$$

The optimal price is higher. Even in a highly competitive environment $e = -6$, the firm can get better than a 10% markup. Further, the optimal price accounts for the labor costs, unlike the cost plus price.

Longer Questions

Question 4

a. Profits are:

$$\begin{aligned}\pi &= P_d Q_d + P_c Q_c - TC = (210 - 10Q_d)\,Q_d + (110 - 5Q_c)\,Q_c - 100 - 10\,(Q_d + Q_c) \\ &= 200Q_d - 10Q_d^2 + 100Q_c - 5Q_c^2 - 100 \end{aligned} \tag{4}$$

To find the optimal quantity (which maximizes profits), we set the derivative or slope equal to zero:

$$\frac{\partial \pi}{\partial Q_d} = 200 - 20Q_d = 0 \quad \rightarrow \quad Q_d = 10 \tag{5}$$

$$\frac{\partial \pi}{\partial Q_c} = 100 - 10Q_c = 0 \quad \rightarrow \quad Q_c = 10 \tag{6}$$

So the optimum is to sell an equal amount to each customer. Using the demand curve, the optimal price is:

$$P_d = 210 - 10 \cdot 10 = \$110 \tag{7}$$

$$P_c = 110 - 5 \cdot 10 = \$60 \tag{8}$$

b. The price elasticity for the dental market is:

$$e_p = \left(\frac{P}{Q}\right)\left(\frac{\partial Q}{\partial P}\right) = \frac{\$110}{10}\frac{-1}{10} = -1.1 \tag{9}$$

$$e_p = \left(\frac{P}{Q}\right)\left(\frac{\partial Q}{\partial P}\right) = \frac{\$60}{10}\frac{-1}{5} = -1.2 \tag{10}$$

The dental market is much larger than the retail market, but also less price sensitive. Therefore, it makes sense to charge more in the dental market, reducing the quantity sold. This problem is equivalent to the airline example, where price discrimination exists against the business traveller.

c. The notes list several possible problems. One example would be that dentists may go to consumer retail outlets to buy the chemical.

Question 5

a. If B predicts A enters, B will not ($14 > 10$), and given that B does not enter, A will

enter ($20 > 8$), so B's prediction is correct and the set of strategies A enters and B does not is a Nash. By symmetry, B enters and A does not is also a Nash equilibrium.

b. No dominant strategies exist, A's optimal strategy depends on whether or not B enters and the reverse.

c. One problem in this game where it is optimal to rush into the market is that demand might not be as great as expected. Firm A may rush into the market, trying to be the first mover, before it has fully analyzed the demand.

Question 6

a. If management resists, it is optimal for the union to strike ($1 > 0$) rather than let management take advantage of the union. If management does not resist it is optimal for the union to strike ($10 > 6$) since management will quickly cave in. Thus a strike is the dominant strategy for the union. Since the game is symmetric, the dominant strategy for management is to resist.

b. From above, both players have a dominant strategy so the Nash equilibrium is where the union strikes and management resists. The firm and union each earn a profit of 1 in the Nash Equilibrium.

c. The matrix of social benefits is:

		Management	
		Don't Resist	Resist
Union	Don't Strike	6+6=12	0+10=10
	Strike	10+0=10	1+1=2

Table 1: Social Benefit

The Nash Equilibrium is the worst possible outcome in the sense that it has the lowest possible social benefit. We have a prisoner's dilemma. If only management and the union could agree to cooperate, they could evenly split the 12 million in profit and both be better off. The problem is that each group has an incentive to fight, even though it undermines the profits of the group as a whole.

d. There is no advantage to a "price matching" policy in this game since both players have a dominant strategy to fight regardless. Threatening a strike (even if credible) does no good, management's best response is to resist the strike anyway. Similarly, threatening to resist the strike (even if credible) does not help management. The union will strike anway, rather than let managment take advantage of them. Thus the answer is identical.