**Principles of Economics I (Fall 2012)**
**Homework #6**
**(Lecture 13-15, Due on Dec. 28, 2012, submitted *out of* class)**

**Note: All textbook problem numbers refer to "Problems and Application" part in corresponding chapter, the 6th Chinese/U.S. edition of the textbook.**

**For Chapter 15**

1. Chapter 15, #5

5. Larry wants to sell as many drinks as possible without losing money, so he wants to set quantity where price (demand) equals average total cost, which occurs at quantity $Q_L$ and price $P_L$ in Figure 6. Curly wants to bring in as much revenue as possible, which occurs where marginal revenue equals zero, at quantity $Q_C$ and price $P_C$. Moe wants to maximize profits, which occurs where marginal cost equals marginal revenue, at quantity $Q_M$ and price $P_M$.

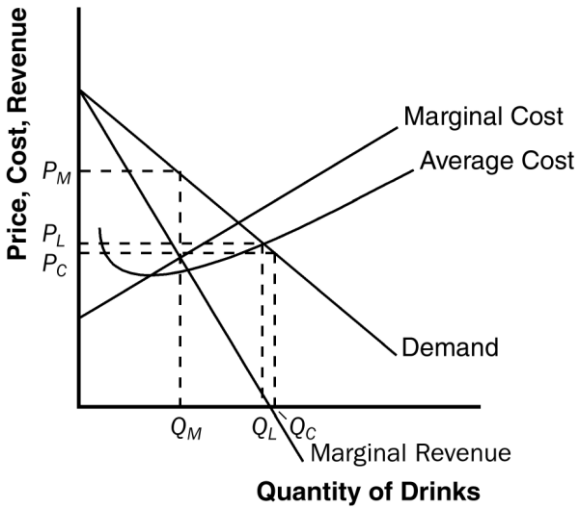


**Figure 6**

2. Chapter 15, #6

6. a. Figure 7 shows the firm's average-total-cost curve and marginal-cost curve. Because average total cost falls continuously as output rises, this firm is a natural monopoly.

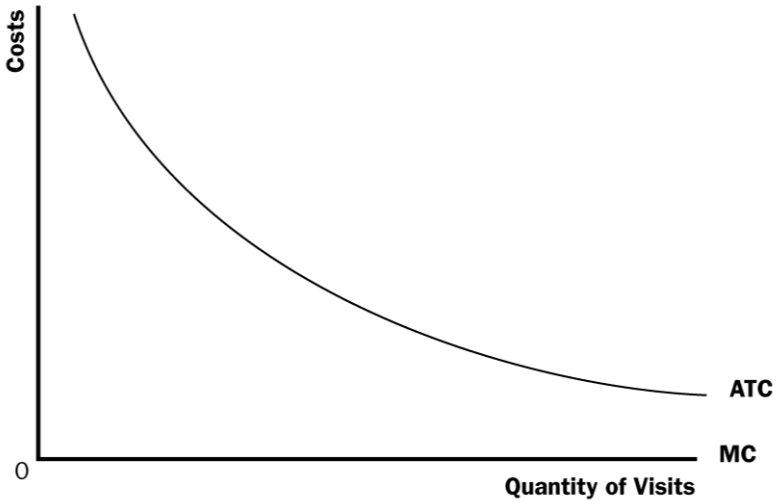


**Figure 7**

b. If price is equal to \$0, each person would visit the museum 10 times (= 10 – 0). Figure 8 shows the value (consumer surplus) the resident would get. Consumer surplus is equal to ½ × 10 × \$10 = \$50 minus the tax (\$24) = \$26.


**Figure 8**

c. The table below shows the total revenue and profit for the town at various prices:

| Price | $Q^d$ per resident | Total Revenue | Profit |
|---|---|---|---|
| \$2 | 8 | 1,600,000 | 800,000 |
| 3 | 7 | 2,100,000 | 300,000 |
| 4 | 6 | 2,400,000 | 0 |
| 5 | 5 | 2,500,000 | 100,000 |

A price of \$4 would allow the town to break even.

d. At a price of $4, each consumer would earn consumer surplus equal to ½ × 6 × 6 = $18. (See Figure 9.) Consumers would be worse off. The town would gain revenue of $24 per person, but it would not offset the drop in consumer surplus. Therefore, there would be a deadweight loss.

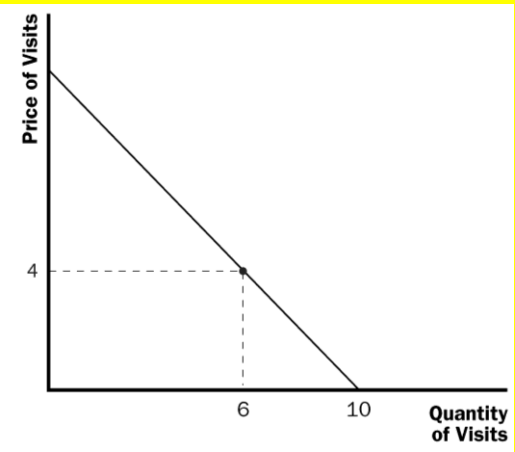


**Figure 9**

e. In the real world, it is unlikely that all residents have the same demand. Thus, an admission price would push more of the cost on those who would use the museum.

3. Chapter 15, #10

10. a. The marginal revenue from selling to each type of consumer is shown in the following tables:

| Price | Quantity of Adult Tickets | Total Revenue from Sale of Adult Tickets | Marginal Revenue from Sale of Adult Tickets |
|---|---|---|---|
| 10 | 0 | 0 | ---- |
| 9 | 100 | 900 | 9 |
| 8 | 200 | 1,600 | 7 |
| 7 | 300 | 2,100 | 5 |
| 6 | 300 | 1,800 | -3 |
| 5 | 300 | 1,500 | -3 |
| 4 | 300 | 1,200 | -3 |
| 3 | 300 | 900 | -3 |
| 2 | 300 | 600 | -3 |
| 1 | 300 | 300 | -3 |
| 0 | 300 | 0 | -3 |

| Price | Quantity of Child Tickets | Total Revenue from Sale of Child Tickets | Marginal Revenue from Sale of Child Tickets |
|---|---|---|---|
| 10 | 0 | 0 | ---- |
| 9 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 |
| 7 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 |
| 5 | 100 | 500 | 5 |
| 4 | 200 | 800 | 3 |
| 3 | 200 | 600 | -2 |
| 2 | 200 | 400 | -2 |
| 1 | 200 | 200 | -2 |
| 0 | 200 | 0 | -2 |

To maximize profit, you should charge adults $7 and sell 300 tickets. You should charge children $4 and sell 200 tickets. Total revenue will be $2,100 + $800 = $2,900. Because total cost is $2,000, profit will be $900.

b. If price discrimination were not allowed, you would want to set a price of $7 for the tickets. You would sell 300 tickets and profit would be $100.

c. The children who were willing to pay $4 but will not see the show now that the price is $7 will be worse off. The producer is worse off because profit is lower. Total surplus is lower. There is no one that is better off.

d. In (a) total profit would be $400. In (b), there would be a $400 loss. There would be no change in (c).

4. Chapter 15, #11

11 a. The monopolist would set marginal revenue equal to marginal cost and then plug the profit-maximizing quantity into the demand curve:

$10 - 2Q = 1 + Q$
$9 = 3Q$
$Q = 3$
$P = 10 - Q = \$7$

Total revenue = $P \times Q$ = ($7)(3) = $21
Total cost = 3 + 3 + 0.5(9) = $10.5
Profit = $21 – $10.5 = $10.5

b. The firm becomes a price taker at a price of $6 and no longer has monopoly power. The firm will export soccer balls because the world price is greater than the domestic price (in the absence of monopoly power). As Figure 11 shows, domestic production will rise to 5 soccer balls, domestic consumption will rise to 4, and exports will be 1.

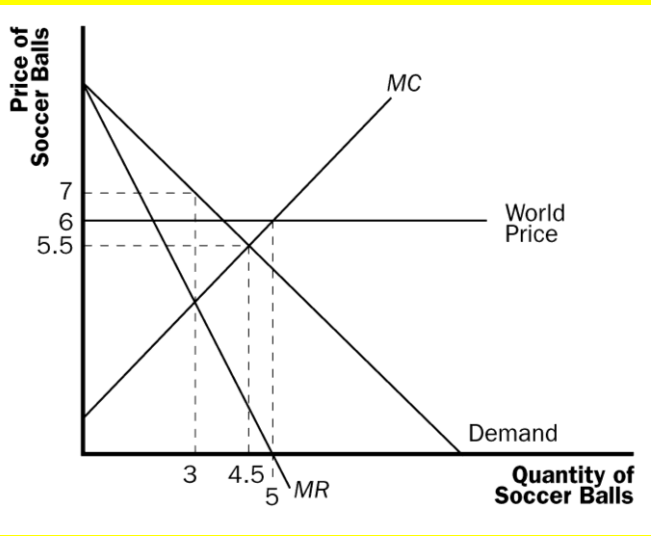


**Figure 11**

c. The price actually falls even though Wickham will now export soccer balls. Once trade begins, the firm no longer has monopoly power and must become a price taker. However, the world price of $6 is greater than the competitive equilibrium price ($5.50) so the country exports soccer balls.

d. Yes. The country would still export balls at a world price of $7. The firm is a price taker and no longer is facing a downward-sloping demand curve. Thus, it is now possible to sell more without reducing price.

5. Chapter 15, # 12

12. a. Figure 12 shows the firm's demand, marginal revenue, and marginal cost curves. The firm's profit is maximized at the output where marginal revenue is equal to marginal cost. Therefore, setting the two equations equal, we get:

$1{,}000 - 20Q = 100 + 10Q$
$900 = 30Q$
$Q = 30$

The monopoly price is $P = 1{,}000 - 10Q = 700$ Ectenian dollars.

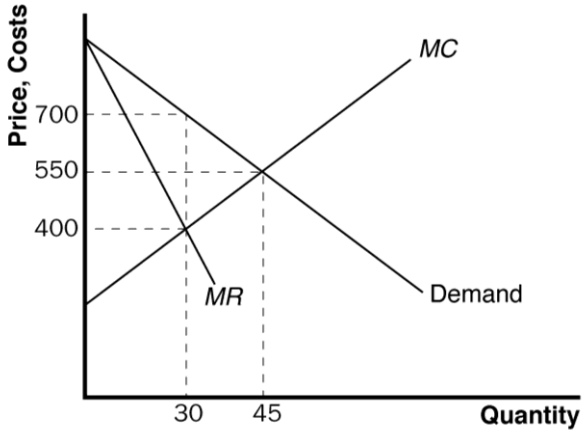


**Figure 12**

b. Social welfare is maximized where price is equal to marginal cost:

$1{,}000 - 10Q = 100 + 10Q$
$900 = 20Q$
$Q = 45$

At an output level of 45, the price would be 550 Ectenian dollars.

c. The deadweight loss would be equal to (0.5)(15)(300 cents) = 2,250 Ectenian dollars.

d. i. A flat fee of $20 would not alter the profit-maximizing price or quantity. The deadweight loss would be unaffected.

ii. A fee of 50 percent of the profits would not alter the profit-maximizing price or quantity. The deadweight loss would be unaffected.

iii. The marginal cost of production would rise by 150 Ectenian dollars if

the director was paid that amount for every unit sold. The new marginal cost would be $100 + 160Q$. The new profit-maximizing output would be 5 and the price would rise to 900. The deadweight loss would be much larger.

iv. If the director is paid 50 percent of the revenue, then total revenue is $500Q - 5Q^2$. Marginal revenue becomes $500 - 10Q$. The profit-maximizing output level will be 20 and the price will be 600 Ectenian dollars. The deadweight loss will be greater.

**For Chapter 16**

6. Chapter 16, #5

5. a. The firm is not maximizing profit. For a firm in monopolistic competition, price is greater than marginal revenue. If price is below marginal cost, marginal revenue must be less than marginal cost. Thus, the firm should reduce its output to increase its profit.

b. The firm may be maximizing profit if marginal revenue is equal to marginal cost. However, the firm is not in long-run equilibrium because price is less than average total cost. In this case, firms will exit the industry and the demand facing the remaining firms will rise until economic profit is zero.

c. The firm is not maximizing profit. For a firm in monopolistic competition, price is greater than marginal revenue. If price is equal to marginal cost, marginal revenue must be less than marginal cost. Thus, the firm should reduce its output to increase its profit.

d. The firm could be maximizing profit if marginal revenue is equal to marginal cost. The firm is in long-run equilibrium because price is equal to average total cost. Therefore, the firm is earning zero economic profit.

7. Chapter 16, #7

7. a. As $N$ rises, the demand for each firm's product falls. As a result, each firm's demand curve will shift in.

b. The firm will produce where $MR = MC$:

$100/N - 2Q = 2Q$
$Q = 25/N$

c. $25/N = 100/N - P$

$P = 75/N$

d. Total revenue = $P \times Q = 75/N \times 25/N = 1875/N^2$

Total cost = $50 + Q^2 = 50 + (25/N)^2 = 50 + 625/N^2$

Profit = $1875/N^2 - 625/N^2 - 50 = 1250/N^2 - 50$

e. In the long run, profit will be zero. Thus:

$1250/N^2 - 50 = 0$

$1250/N^2 = 50$

$N = 5$

8. Chapter 16, #8

8. Figure 5 shows the cost, marginal revenue and demand curves for the firm under both conditions.

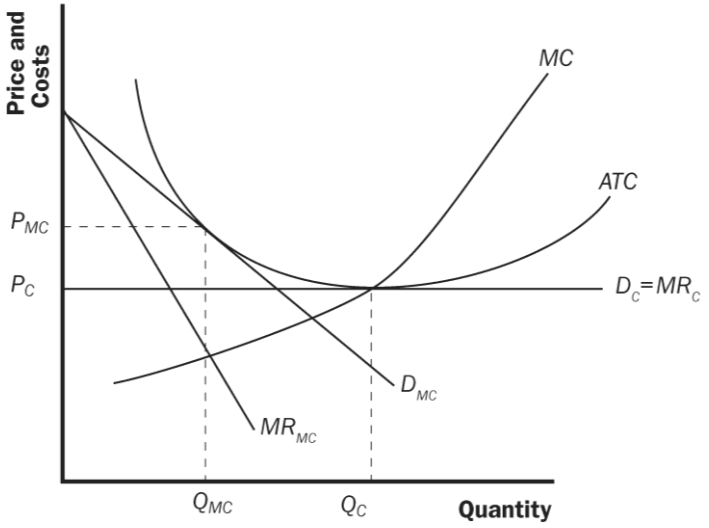


**Figure 5**

a. The price will fall from $P_{MC}$ to the minimum average total cost ($P_C$) when the market becomes perfectly competitive.

b. The quantity produced by a typical firm will rise to $Q_C$, which is at the efficient scale of output.

c. Average total cost will fall as the firm increases its output to the efficient scale.

d. Marginal cost will rise as output rises. Marginal cost is now equal to price.

e. Profit will not change. In either case, the market will move to long-run equilibrium where all firms will earn zero economic profit.

9. Chapter 16, #10

b. In the long run, firms will enter, shifting the demand for Sleek's product to the left. Its price and output will fall. Firms will enter until profits are equal to zero (as shown in Figure 7).

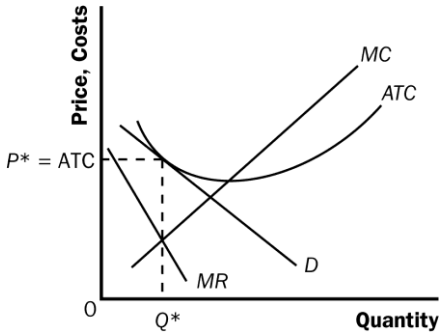


**Figure 7**

c. As consumers become more focused on the stylistic differences in brands, they will be less focused on price. This will make the demand for each firm's products more price inelastic. The demand curves may become relatively steeper, allowing Sleek to charge a higher price. If these stylistic features cannot be copied, they may serve as a barrier to entry and allow Sleek to earn profit in the long run.

d. A firm in monopolistic competition produces where marginal revenue is greater than zero. This means that firm must be operating on the elastic portion of its demand curve.

**For Chapter 17**

10. Chapter 17, # 1

1. a. If there were many suppliers of diamonds, price would equal marginal cost ($1,000), so the quantity would be 12,000.

b. With only one supplier of diamonds, quantity would be set where marginal cost equals marginal revenue. The following table derives marginal revenue:

| Price (thousands of dollars) | Quantity (thousands) | Total Revenue (millions of dollars) | Marginal Revenue (millions of dollars) |
|---|---|---|---|
| 8 | 5 | 40 | ---- |
| 7 | 6 | 42 | 2 |
| 6 | 7 | 42 | 0 |
| 5 | 8 | 40 | –2 |
| 4 | 9 | 36 | –4 |
| 3 | 10 | 30 | –6 |
| 2 | 11 | 22 | –8 |
| 1 | 12 | 12 | –10 |

With marginal cost of $1,000 per diamond, or $1 million per thousand diamonds, the monopoly will maximize profits at a price of $7,000 and a quantity of 6,000. Additional production beyond this point would lead to a situation where marginal revenue is lower than marginal cost.

c. If Russia and South Africa formed a cartel, they would set price and quantity like a monopolist, so the price would be $7,000 and the quantity would be 6,000. If they split the market evenly, they would share total revenue of $42 million and costs of $6 million, for a total profit of $36 million. So each would produce 3,000 diamonds and get a profit of $18 million. If Russia produced 3,000 diamonds and South Africa produced 4,000, the price would decline to $6,000. South Africa's revenue would rise to $24 million, costs would be $4 million, so profits would be $20 million, which is an increase of $2 million.

d. Cartel agreements are often not successful because one party has a strong incentive to cheat to make more profit. In this case, each could increase profit by $2 million by producing an extra 1,000 diamonds. However, if both countries did this, profits would decline for both of them.

11. Chapter 17, # 6

6. a. The payoffs are:

| | | **Your Decision** | |
|---|---|---|---|
| | | Work | Shirk |
| **Classmate's Decision** | Work | You get 15 units of happiness<br>Classmate gets 15 units of happiness | You get 30 units of happiness<br>Classmate gets 5 units of happiness |
| | Shirk | You get 5 units of happiness<br>Classmate gets 30 units of happiness | You get 10 units of happiness<br>Classmate gets 10 units of happiness |

b. The likely outcome is that both of you will shirk. If your classmate works, you're better off shirking, because you would rather have 30 units of happiness rather than 15. If your classmate shirks, you are better off shirking because you would rather have 10 units of happiness rather than 5. So your dominant strategy is to shirk. Your classmate faces the same payoffs, so he or she will also shirk.

c. If you are likely to work with the same person again, you have a greater incentive to work, so that your classmate will work, and you will both be better off. In repeated games, cooperation is more likely.

d. The payoff matrix would become:

| | | **Your Decision** | |
|---|---|---|---|
| | | Work | Shirk |
| **Classmate's Decision** | Work | You get 15 units of happiness<br>Classmate gets 65 units of happiness | You get 30 units of happiness<br>Classmate gets 25 units of happiness |
| | Shirk | You get 5 units of happiness<br>Classmate gets 50 units of happiness | You get 10 units of happiness<br>Classmate gets 10 units of happiness |

Work is a dominant strategy for this new classmate. Therefore, the Nash equilibrium will be for you to shirk and your classmate to work. You would get a B and thus would prefer this classmate to the first. However, he would prefer someone with a dominant strategy of working as well so that he could get an A.

12. Chapter 17, #8

8. a. The playoff matrix for this game is:

| | | **Player One's Decision** | |
|---|---|---|---|
| | | Take Drug | Don't Take Drug |
| **Player Two's Decision** | Take Drug | Player 1 gets 5,000 – $X$<br>Player 2 gets 5,000 – $X$ | Player 1 gets 0<br>Player 2 gets 10,000 – $X$ |
| | Don't Take Drug | Player 1 gets 10,000 – $X$<br>Player 2 gets 0 | Player 1 gets 5,000<br>Player 1 gets 5,000 |

b. Taking the drug will be a dominant strategy for each player as long as $X$ is less than 5,000.

c. Making the drug safer (lowering $X$) raises the likelihood of taking the drug because it increases the payoff.

13. Chapter 17, #9

9. a. If Kona enters, Big Brew would want to maintain a high price. If Kona does not enter, Big Brew would want to maintain a high price. Thus, Big Brew has a dominant strategy of maintaining a high price.

If Big Brew maintains a high price, Kona would enter. If Big Brew maintains a low price, Kona would not enter. Kona does not have a dominant strategy.

Because Big Brew has a dominant strategy of maintaining a high price, Kona should enter.

b. There is only one Nash equilibrium. Big Brew will maintain a high price and Kona will enter.

c. Little Kona should not believe this threat from Big Brew because it is not in Big Brew's interest to carry out the threat. If Little Kona enters, Big Brew can set a high price, in which case it makes $3 million, or Big Brew can set a low price, in which case it makes $1 million. Thus the threat is an empty one, which Little Kona should ignore; Little Kona should enter the market.

14. Chapter 17, #10

10. a. Using Table 1 in the chapter, if 80 gallons are produced, the price would be $40 and profit would be $3,200. Divided three ways, John would get $3,200/3 = $1,066.67. Each seller would sell 80/3 = 26.67 gallons.

b. If Jack and Jill stick to the agreement, John will benefit from increasing output by 10 units. The price would fall to $30. Jack's total profit would increase to (36.67)($30) = $1,100.10.

c. The Nash equilibrium will be $(n + 1)/n = 3/4$ of the competitive output. Thus, output will be 90 gallons, which is greater than the output when there were only two sellers. The price will now be $30.

15. 赚钱软件公司生产两种办公软件：写字软件和制表软件。有两种类型的顾客——作家和会计师，各有 1 万人。作家愿意花 150 元买写字软件，50 元买制表软件。会计师正好相反，愿意花 150 元买制表软件，50 元买写字软件。如果赚钱软件公司决定分别对这两种软件定价，为了谋求最大利润，它应该分别定多高的价格？如果它向两类顾客以单一价格同时出售两种软件（即“捆绑”销售），它应该定多高的价格？已知生产两种软件的边际成本接近于零，则上述两种定价方式中的哪一种能够实现社会福利最大？

A. 每个软件定价 50 元；捆绑销售定价 200 元；二者均实现社会福利最大
B. 每个软件定价 150 元；捆绑销售定价 200 元；二者均未实现社会福利最大
C. 每个软件定价 50 元；捆绑销售定价 200 元；前者实现社会福利最大
D. 每个软件定价 150 元；捆绑销售定价 200 元；后者实现社会福利最大

答案：D