

# Problem Set 3

## Answers and Selected Solutions

Principles of Economics

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### The Costs of Production

1. AJ opens a lemonade stand for two hours. He spends \$10 for ingredients and sells \$60 worth of lemonade. In those same two hours, he could have cleaned his neighbor's pool for \$40. AJ has an accounting profit of \_\_\_\_\_ and an economic profit of \_\_\_\_\_.  
(a) \$50; \$10  
(b) \$90; \$50  
(c) \$10; \$50  
(d) \$50; \$90

**Solution:** Total revenue = \$60. Explicit costs = \$10. Implicit costs = \$40. Accounting profit =  $TR - \text{explicit costs} = \$50$ . Economic profit =  $TR - (\text{explicit costs} + \text{implicit costs}) = \$10$ .

2. Ray left his job as a stock broker where he was earning \$70,000 a year to start a cookie business. Over the past year, Ray sold 50,000 boxes of cookies at a price of \$4.00 per box. He also incurred labor costs of \$60,000 and paid \$20,000 for raw materials. Ray's accounting profit for the year was  
(a) \$70,000.  
(b) \$120,000.  
(c) \$50,000.  
(d) \$80,000.
3. A firm is able to produce 165 units of output per day when 15 workers are hired. If the firm hires 16 workers, it can increase its output to 176 units. The marginal product of the 16th worker is  
(a) 10 units.  
(b) 16 units.  
(c) 11 units.  
(d) 176 units.
4. A firm is producing 100 units with an average total cost of \$25 and a marginal cost of \$15. If it were to increase production to 101 units, which of the following must occur?

- (a) Marginal cost would decrease.
- (b) Marginal cost would increase.
- (c) Average total cost would decrease.
- (d) Average total cost would increase.

**Solution:** If  $MC < ATC$ , then it must be that  $ATC$  are decreasing.

5. Bluth's Bananas currently employs 5 workers and produces 1,000 frozen bananas a day. In preparation for the busy summer season, the firm is debating whether they should hire 5 more workers. If they do, they project they could produce 1,500 frozen bananas a day. Given this, the marginal product of labor per worker from these additional workers would be
- (a) 1,500.
  - (b) 500.
  - (c) 150.
  - (d) 100.

**Solution:**  $MP_L = \frac{\Delta Q}{\Delta L} = \frac{(1,500-1,000)}{5} = 100$ .

6. Keystone Fireworks has fixed costs of \$10 and the marginal costs outlined in Table 1.

Table 1: Marginal Costs for Cheerwine

Quantity	Marginal Cost
1	\$2
2	\$4
3	\$7
4	\$11
5	\$16
6	\$22

What is the average total cost of producing the fifth unit?

- (a) \$3.20
- (b) \$10.00
- (c) \$5.20
- (d) \$8.00

7. Shell Tires has fixed costs of \$300,000 per year. Last year, it produced 10,000 tires with an average variable cost of \$80. What were the firm's average total costs for last year?
- (a) \$80
  - (b) \$90
  - (c) \$100
  - (d) \$110

**Solution:**  $ATC = TC/Q = (FC + VC)/Q = AFC + AVC = \$300,000/10,000 + \$80 = \$110$ .

8. Keystone Fireworks has fixed costs of \$100 and the marginal costs outlined in Table 3.

Table 2: Marginal Costs for Keystone

Quantity	Marginal Cost
1	\$2
2	\$4
3	\$6
4	\$8
5	\$10
6	\$12

What is the average variable cost of producing the fifth unit?

- (a) \$2
- (b) **\$6**
- (c) \$10
- (d) \$30

**Solution:** At  $Q=0$ ,  $VC = \$0$ . At  $Q=1$ ,  $MC = \$2$  which means  $VC$  increased by \$2 when going from  $Q=0$  to  $Q=1$ . So, at  $Q=1$ ,  $VC = \$2$ . At  $Q=2$ ,  $MC = \$4$ , so  $VC$  increased by \$4 when going from  $Q=1$  to  $Q=2$ . Since  $VC = \$2$  at  $Q=1$ , at  $Q=2$   $VC = \$6$ . Continuing this process until  $Q=5$ , we have that  $VC = \$30$ .  $AVC = VC/Q = \$30/5 = \$6$ .

Table 3: Marginal Costs for Keystone

Quantity	Marginal Cost	<b>Variable Costs</b>
1	\$2	<b>\$2</b>
2	\$4	<b>\$6</b>
3	\$6	<b>\$12</b>
4	\$8	<b>\$20</b>
5	\$10	<b>\$30</b>
6	\$12	<b>\$42</b>

9. A firm currently produces 1,000 units of output with an average variable cost of \$5.10. The firm has fixed costs of \$5,000. If the firm were to produce 1,001 units, its total variable costs would be \$5,400. What is the marginal cost to the firm of producing 1,001 units?
- (a) \$5,400
  - (b) **\$300**
  - (c) \$5,100
  - (d) \$400

**At 1,000 units,  $VC = 1,000 \times 5.10 = \$5,100$ .  $MC = \frac{\Delta VC}{\Delta Q} = \frac{(5,400 - 5,100)}{1} = \$300$ .**

10. A firm is producing 500 units with an average total cost of \$10 and a marginal cost of \$15. If it were to increase production to 501 units, which of the following must occur?
- (a) Marginal cost would decrease.
  - (b) Marginal cost would increase.
  - (c) Average total cost would decrease.
  - (d) Average total cost would increase.
11. Jay's Chocolates produces boxes of chocolates for its mail order catalogue business. He rents a small room for \$150 a week that serves as his factory. Workers can be hired for \$275 per week. There are no other costs.
- Table 4 shows certain characteristics of the business. One week, Jay realizes revenue of \$1,100, leading to a profit of \$125. How many boxes of chocolate did he produce?

Table 4: Jay's Chocolate

Workers	Boxes	MPL	Cost of Factory	Cost of Workers	Total Cost
0	0				
1		330	150	275	425
2	630				
3		150		825	975
4	890				
5	950	60		1,375	
6		10			1,800

- (a) 140
  - (b) 330
  - (c) 780
  - (d) 950
12. If there are no implicit costs of production,
- (a) economic profit will exceed accounting profit.
  - (b) accounting profit will exceed economic profit.
  - (c) economic profit and accounting profit will be equal.
  - (d) economic profit will be zero.
  - (e) accounting profit will be zero.
13. If a production function exhibits diminishing marginal product, its slope
- (a) becomes flatter as the quantity of input increases.
  - (b) becomes steeper as the quantity of input increases.
  - (c) is constant.
  - (d) could be any of the above.
14. Which of the following statements is true?
- (a) All costs are fixed in the long run.

- (b) All costs are variable in the long run.
  - (c) All costs are fixed in the short run.
  - (d) All costs are variable in the short run.
15. Your roommate's food truck sells delicious burritos every Friday night. He tells you a story that as he closed up shop last weekend, an inebriated patron yelled at him to make him one for \$10.00. Your roommate had already sold 200 burritos that night, but usually has to sell them for \$4.00 due to market conditions. He tells you that he obviously sold him the burrito for \$10.00. If he faces the cost schedule detailed in Table 5, was this the right decision? Explain why or why not.

Table 5: Burrito Costs

Quantity	ATC
199	\$1.99
200	\$2.00
201	\$2.05

**Solution:** Your roommate should sell the burrito as long as  $MR \geq MC$ .  $MR = \$4$ . At  $Q=200$ ,  $TC = \$2.00 \times 200 = \$400$  and at  $Q=201$   $TC = \$2.05 \times 201 = \$412.05$ .  $MC = 412.05 - 400 = \$12.05$ . Your friend should not have the sold burrito for \$10, as he would actually decrease his profit for the day by \$2.05.

## Perfect Competition

1. If a profit-maximizing competitive firm is producing a quantity at which marginal cost is between average variable cost and average total cost, it will
  - (a) keep producing in the short run, but exit the market in the long run.
  - (b) shut down in the short run, but return to production in the long run.
  - (c) shut down in the short run and exit in the long run.
  - (d) keep producing in both the short run and the long run.

**Solution:** A competitive firm produces where  $P = MC$ . For prices where  $AVC < P < ATC$ , the firm produces in the short-run, but will shut down in the long-run.

2. Profit for a firm in a perfectly competitive market is positive whenever
  - (a)  $P < ATC$ .
  - (b)  $P < MC$ .
  - (c)  $P > MC$ .
  - (d)  $P > ATC$ .

**Solution:**  $\Pi = TR - TC = (P - ATC) \cdot Q \Rightarrow \Pi > 0 \iff P > ATC$ .

3. Consultants hired by Sunnyside Eggs find that the firm has total fixed costs of \$50,000, total variable costs of \$25,000, and total revenues of \$40,000. Given this, in the short run the firm should \_\_\_\_\_ and make \_\_\_\_\_ profit.
- (a) shut down; negative
  - (b) shut down; zero
  - (c) stay open; negative
  - (d) stay open; positive

**Solution:** Short-run decision: Shut down if  $TR < VC$ , operate if  $TR > VC$ . Firm should operate in the short run.  $\Pi = TR - TC = \$40,000 - (50,000 + 25,000) = -\$35,000$ .

4. The market for Kale is perfectly competitive. It follows that the demand for any individual soybean producer's output is
- (a) perfectly inelastic.
  - (b) perfectly elastic.
  - (c) unit elastic.
  - (d) downward sloping.
5. A firm in a perfectly competitive market sells 8 units of output and has a marginal revenue of \$8. What would be the firm's total revenue if it sold 4 units of output?
- (a) \$4
  - (b) \$8
  - (c) \$32
  - (d) \$64
  - (e) There is not enough information to answer this question.

For questions 6 and 7, refer to Table 6.

Table 6: Competitive Firm

Quantity	Total Revenue	Total Cost
0	\$0	\$30
1	\$80	\$50
2	\$160	\$80
3	\$240	\$120
4	\$320	\$170
5	\$400	\$230
6	\$480	\$300
7	\$560	\$380
8	\$640	\$470

6. What is the marginal cost at the profit maximizing quantity?

- (a) \$50
- (b) \$80
- (c) \$230
- (d) \$300

**Solution:** Maximize profit at  $Q$  where  $MR = MC$ .

7. What is the average fixed cost at the profit maximizing quantity?

- (a) \$54.30
- (b) \$4.28
- (c) \$50
- (d) \$80

**Solution:**  $Q^* = 7$  (where  $MR = MC$ ).  $FC = \$30$  (total cost at  $Q = 0$ ).  $AFC = FC/Q = \$30/7 = \$4.28$ .

8. Suppose the market for corn is perfectly competitive. Which of the following represents the long-run relationship between the price, marginal cost, and average total cost at the profit-maximizing quantity?

- (a)  $P > MC = ATC$
- (b)  $P = MC > ATC$
- (c)  $P = MC = ATC$
- (d)  $P > MC > ATC$

9. Natalie the baker wants to establish a pie factory in a competitive market. The cost of leasing the factory is \$800 a day. The profit maximizing quantity of pies is 1,000 a day, each pie sells for \$3, and has a variable cost of only \$1.50. Which of the following is true?

- (a) Natalie should enter the industry.
- (b) Natalie should not enter the industry.
- (c) Natalie would enjoy profits of \$3,000 a day.
- (d) Both (a) and (c) are true.

**Solution:** Enter market if  $TR \geq TC \iff P \geq ATC$ .  $TR = \$3 \cdot 1,000 = \$3,000$  and  $TC = \$800 + \$1.50 \cdot 1,000 = \$2,300$ . Thus, Natalie should enter the market and will make a profit of  $\$3,000 - \$2,300 = \$700/\text{day}$ .

10. In order to maximize profit, a firm in a perfectly competitive market will produce at the quantity where

- (a)  $AR = MC$ .
- (b)  $P = ATC$ .
- (c)  $P = AVC$ .
- (d)  $MR = ATC$ .

**Solution:** Always produce where  $MR = MC$ . For competitive firms,  $MR = P = AR$ .

11. Suppose the market for corn is perfectly competitive. Which of the following represents the long-run relationship between the price, marginal cost, and average total cost at the profit-maximizing quantity?

- (a)  $P > MC = ATC$
- (b)  $P = MC > ATC$
- (c)  $P = MC = ATC$
- (d)  $P > MC > ATC$

**Solution:** Firms in PC produce where  $P = MC$ . In the long run, firms in PC make zero economic profit so  $P = ATC$ .

12. Al's Burgers is a firm in a competitive market and faces the cost structure shown in Figure 1.

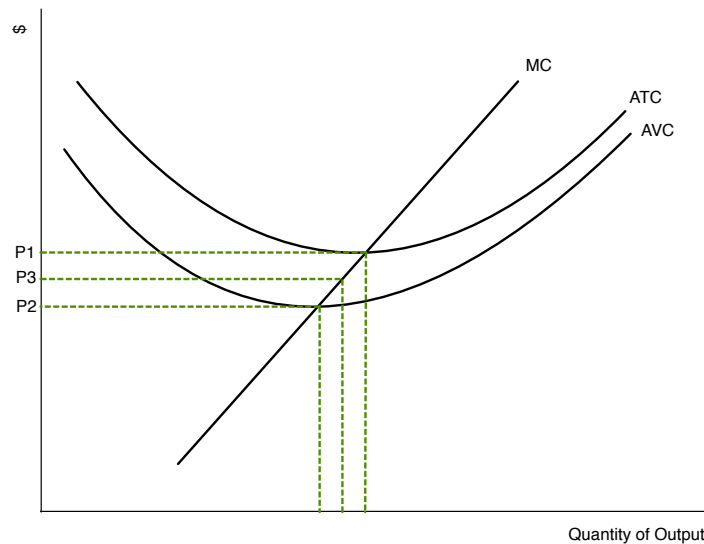


Figure 1: Al's Burgers

The firm decides to operate in the short run, but incurs economic losses. Thus, the market price must be

- (a) less than P2.
- (b) greater than P2 but less than P3.
- (c) greater than P3 but less than P1.
- (d) greater than P2 but less than P1.
- (e) greater than P1.

**Solution:** Operate in SR along  $MC$  curve above  $AVC$ . If operating at a loss,  $P < ATC$  and so price must be  $P2 < P < P1$ .



13. In the short run, the competitive firm's supply curve is the
- (a) entire marginal cost curve.
  - (b) portion of the marginal cost curve that lies above the average total cost curve.
  - (c) portion of the marginal cost curve that lies above the average variable cost curve.
  - (d) upward-sloping portion of the average total cost curve.
  - (e) downward-sloping portion of the average total cost curve.
14. A grocery store should close at night if the
- (a) total costs of staying open exceed the total revenue from staying open.
  - (b) total revenue from staying open exceed the total costs of staying open.
  - (c) variable costs of staying open exceed the total revenue from staying open.
  - (d) total revenue from staying open exceed the variable costs of staying open.
15. In the long run, firms will exit the market if the price of a good is less than
- (a) marginal revenue.
  - (b) marginal cost.
  - (c) average revenue.
  - (d) average variable cost.
  - (e) average total cost.
16. Natalie's Ball Bearings, Inc. faces the following costs of production outlined in Table 7.

Table 7: Cost of Ball Bearings

Quantity (in cases)	Total Fixed Costs	Total Variable Costs
0	\$100	
1		\$50
2		\$70
3		\$90
4		\$140
5		\$200
6		\$360

- (a) Suppose the market for ball bearings is perfectly competitive and the price of a case is \$50. The CEO sees that he can't make a profit, and so decides to shut down operations. What is the firm's profit (or loss) as a result of this decision? Do you agree with the CEO's decision? Why or why not?

**Solution:** If firm shuts down,  $TR = 0$ ,  $VC = 0$ , and  $FC = \$100$  so  $\Pi = -\$100$ .

To find optimal quantity, use variable cost column to compute  $MC$ .  $MC = \$50$  at  $Q = 1$  and  $Q = 4$ . At  $Q = 1$ ,  $\Pi = \$50 \times 1 - \$150 = -\$100$ . At  $Q = 4$ ,  $\Pi = \$50 \times 4 - \$240 = -\$40$ . Don't agree since  $TR > VC$  at  $Q = 4$ , the firm should produce in the SR even if it is making losses since it would lose more by shutting down.

- (b) If instead the CEO decided to produce 1 case of ball bearings, what would be the firm's profit (or loss)? Is this the best decision? Why?

**Solution:** See (a). Always produce on part of  $MC$  curve past its minimum.  $MC$  decreases from  $Q = 1$  to  $Q = 2$ , so  $Q = 1$  cannot be optimal quantity.

17. A firm is currently in a market with the conditions outlined in Table 8. The firm has fixed costs of \$1,500 per day.

Table 8: Market Environment

Quantity/day	Total Revenue	Marginal Cost	Variable Costs	Total Costs
1	\$600	\$1,000	<b>1000</b>	<b>2500</b>
2	\$1,200	\$400	<b>1400</b>	<b>2900</b>
3	\$1,800	\$500	<b>1900</b>	<b>3400</b>
4	\$2,400	\$600	<b>2500</b>	<b>4000</b>
5	\$3,000	\$800	<b>3300</b>	<b>4800</b>

Use this information to answer the following questions.

- (a) What type of market environment is this firm in? Explain why.

**Solution:** The firm is in a perfectly competitive market since  $P = MR = \$600$ .

- (b) Fill in the column labeled “Variable Costs.”

- (c) Fill in the column labeled “Total Costs.”

- (d) What level of production should the firm operate at? Explain why.

**Solution:** The firm should operate at  $Q^* = 0$  (shutdown) because  $VC > TR$  at the quantity where  $MR = MC$  ( $Q = 4$ ).

- (e) What will be the firm’s profits per day at this production level?

**Solution:**  $\Pi = -\$1,500$  (fixed costs).

## Monopoly

1. Assuming the same cost structure, a competitive market produces \_\_\_\_\_ output at \_\_\_\_\_ prices than a monopoly market.

- (a) less; lower
- (b) **more; lower**
- (c) less; higher
- (d) more; higher

**Solution:** Monopolies charge a mark-up over the marginal cost and produce less than a competitive market.

Refer to Table 9 for questions 2 and 3.

2. What is the marginal cost of the 6<sup>th</sup> shirt?

- (a) \$44
- (b) \$46

Table 9: Monopolist Environment

Price	Quantity Demanded	Total Cost
\$170	0	\$100
\$160	1	\$140
\$150	2	\$184
\$140	3	\$230
\$130	4	\$280
\$120	5	\$335
\$110	6	\$395
\$100	7	\$475
\$90	8	\$565

(c) \$55

(d) \$60

**Solution:**  $MC = \Delta TC / \Delta Q$ . At  $Q = 6$ ,  $MC = 395 - 335 = \$60$ .

3. What is total profit at the profit-maximizing quantity?

(a) \$100

(b) \$245

(c) \$265

(d) \$395

**Solution:** Maximize profit where  $MC = MR$ .  $MR = \Delta TR / \Delta Q$ , so need to find  $TR = P \times Q$  at each price first, then find  $MR$ .  $MR = MC = \$60$  at  $Q = 6$ , so  $Q^* = 6$  and  $\Pi = \$660 - 395 = \$265$ .

4. Consider Table 10, which shows the environment faced by a monopolist.

Table 10: Market Environment

Output	Total Revenue	Variable Costs
1	\$50	\$30
2	\$80	\$60
3	\$90	\$90
4	\$80	\$120
5	\$50	\$150
6	\$20	\$180
7	\$10	\$210

What price will this firm charge in order to maximize profits?

(a) \$40

(b) \$30

- (c) \$20
- (d) \$10

Use Figure 2, which represents the environment faced by a monopoly, for questions 5 and 6.

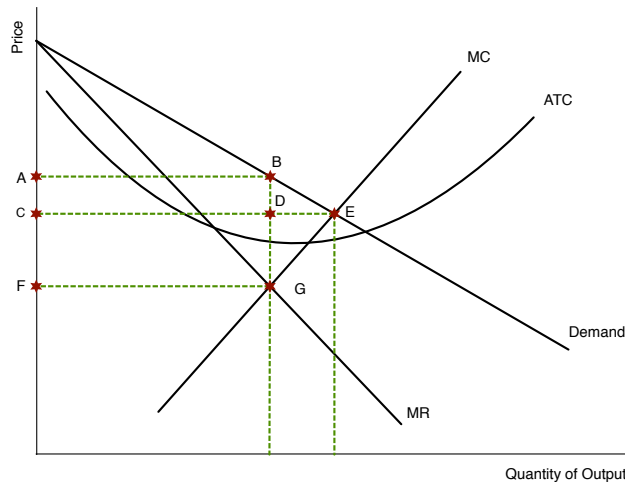


Figure 2: Monopolist Environment

5. Which of the following represents the lost trade that is responsible for the deadweight loss?

- (a) Distance ab
- (b) Distance ce
- (c) Distance de
- (d) Distance cd

**Solution:** Optimal quantity where  $MC = \text{Demand}$ . Monopolist produces where  $MR = MC$ . Lost trades between distance de.

6. Which of the following areas represents the deadweight loss due to monopoly pricing?

- (a) Triangle bge
- (b) Triangle bde
- (c) Rectangle acdb
- (d) Rectangle cfgd

**Solution:** DWL comes from those trades that are not taking place where demand is above  $MC$ .

7. Which of the following is **not** a barrier to entry in a monopolized market?

- (a) The government gives a single firm the exclusive right to produce some good.
- (b) The costs of production make a single producer more efficient than a large number of producers.

- (c) A key resource is owned by a single firm.
  - (d) A single firm is very large.
8. A firm whose average total cost continually declines at least to the quantity that will supply the entire market is known as a
- (a) perfect competitor.
  - (b) natural monopoly.
  - (c) government monopoly.
  - (d) regulated monopoly.
9. Which of the following statements about price and marginal revenue in competitive and monopolized markets is true?
- (a) Price equals marginal revenue in both markets.
  - (b) Price equals marginal revenue in competitive markets, while price exceeds marginal revenue in monopoly markets.
  - (c) Price exceeds marginal revenue in competitive markets, while price equals marginal revenue in monopoly markets.
  - (d) Price exceeds marginal revenue in both markets.
10. Consider Figure 3, which shows the cost structure of a monopolist.

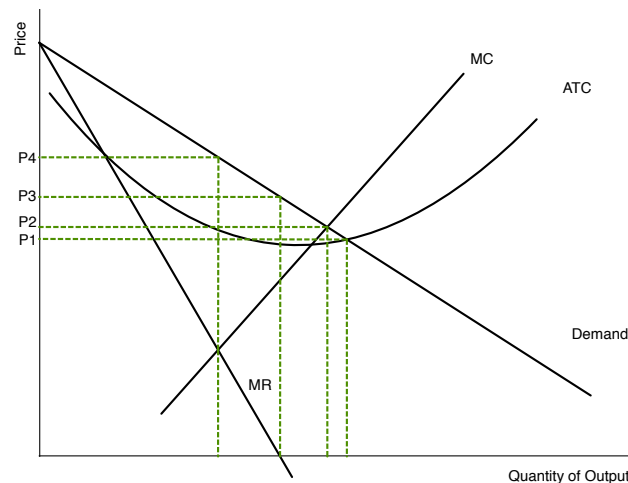


Figure 3: Monopolist Environment

If the firm wishes to maximize total revenue, it should charge price \_\_\_\_\_, while the price it should charge to maximize output while not making losses is \_\_\_\_\_.

- (a) P4; P2
- (b) P3; P1
- (c) P2; P4
- (d) P3; P2
- (e) None of the above

**Solution:** Maximize  $TR$  where at  $Q$  where  $MR = 0$ . Trace up to demand curve to find price ( $P3$ ). Losses occur when  $P < ATC$ . Lower price until  $P = ATC$  to maximize output while not making losses.  $P = P1$ .

11. A profit-maximizing monopolist will produce the level of output at which
- (a) average revenue is equal to average total cost.
  - (b) price is equal to marginal cost.
  - (c) marginal revenue is equal to marginal cost.
  - (d) total revenue is equal to opportunity cost.

**Solution:** Any firm should produce where  $MR = MC$  in order to maximize profits. This holds true in any type of market structure. (b) is only true for firms in a perfectly competitive market.

12. If economies of scale exist, and government regulators force the monopolist to set price equal to marginal cost,
- (a) the monopolist will still earn a profit, just smaller than with no regulation.
  - (b) there will be no incentive to innovate.
  - (c) the market will be less efficient than if regulators set prices equal to average total cost.
  - (d) the monopolist will be taking a loss.

**Solution:** For monopolies with economies of scale,  $MC < ATC$ . If the government forces the monopolist to charge  $P = MC$  (this is the point where the demand and MC curve meet), then  $P < ATC$  and  $\Pi < 0$ .

13. Suppose a firm sells 25 units at a price of \$10. Calculate its marginal revenue per unit of output if it sells 5 more units of output when it reduces its price to \$9. Is this firm in a competitive market or non-competitive market?
- (a) \$20; non-competitive
  - (b) \$4; non-competitive
  - (c) \$270; non-competitive
  - (d) \$2.50; competitive
  - (e) None of the above.
14. Using government regulations to force a natural monopoly to charge a price equal to its marginal cost will
- (a) improve efficiency.
  - (b) raise the price of the good.
  - (c) attract additional firms to the market.
  - (d) cause the monopolist to exit the market.

15. Which of the following statements about price discrimination is **not** true?

- (a) Price discrimination can raise economic welfare.
  - (b) Price discrimination requires that the seller be able to separate buyers according to their willingness to pay.
  - (c) Perfect price discrimination generates a deadweight loss.
  - (d) Price discrimination increases a monopolist's profits.
16. Suppose a firm has a patent on a process to make unique smoked salmon. Table 11 shows information about the demand curve facing this firm.

Table 11: Demand for Smoked Salmon

Price	Quantity Demanded (lbs)
\$20	0
\$18	1
\$16	2
\$14	3
\$12	4
\$10	5
\$8	6
\$6	7

- (a) Suppose there are no fixed costs to produce this salmon and that the marginal cost of production is a constant \$6 per pound. Note: This implies that the average total cost is also a constant \$6 per pound. What is the quantity and price chosen by the monopolist?

**Solution:** The monopolist should produce at the quantity where  $MR = MC$  (or as close as possible such that  $MR > MC$ ). From the table, we need to find the marginal revenue from each pound of salmon:

Table 12: Demand for Smoked Salmon

Price	Quantity Demanded (lbs)	TR ( $P \times Q$ )	MR ( $\Delta TR / \Delta Q$ )
\$20	0	\$0	—
\$18	1	\$18	\$18
\$16	2	\$32	\$14
\$14	3	\$42	\$10
\$12	4	\$48	\$6
\$10	5	\$50	\$2
\$8	6	\$48	-\$2
\$6	7	\$42	-\$6

Thus, the monopolist should produce 4 units. The corresponding price is \$12.

- (b) What is the monopolist's profit at this quantity?

**Solution:**  $\Pi = (P - ATC) \times Q = (\$12 - \$6) \times 4 = \$24$ .

- (c) What is the price and quantity that maximizes total surplus?

**Solution:** The efficient quantity (where total surplus is maximized) is where  $P = MC$ . This corresponds to a price of \$6 and a quantity of 7 units.

- (d) Compare the monopoly and the efficient solution. Is the monopolist's price too high or too low? Is the monopolist's quantity too high or too low?

**Solution:** As usual, the monopolist charges a higher price and produces less than the optimal quantity.

- (e) What is the deadweight loss in this market if the monopolist charges the monopoly price?

**Solution:** The deadweight loss in a monopoly market comes from the unrealized transactions where the buyer value exceeds the marginal cost of production. In this problem, only 4 lbs of salmon are produced by the monopolist, but the efficient quantity is 7 lbs. The deadweight loss is the difference between the buyer value and marginal cost for the three transactions not taking place that should be.  $DWL = (\$10 - \$6) + (\$8 - \$6) + (\$6 - \$6) = \$6$ .

- (f) If the monopolist is able to perfectly price discriminate without cost, is the outcome efficient? What is the value of total surplus in this case?

**Solution:** Yes, this would be efficient. In this case, the monopolist would charge each consumer who is willing to pay above the marginal cost exactly their willingness to pay. Thus, consumer surplus is zero and the producer surplus is equal to the total surplus. The surplus realized from each transaction for the monopolist is the consumer's willingness to pay (i.e., the price they pay) and the marginal cost.  $TS = PS = (\$18 - \$6) + (\$16 - \$6) + (\$14 - \$6) + (\$12 - \$6) + (\$10 - \$6) + (\$8 - \$6) + (\$6 - \$6) = \$42$ .