

Dr. Barry Haworth  
University of Louisville  
Department of Economics  
Economics 201  
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### **Homework #4 (due by 9:00pm on Thursday, April 13)**

*Please submit your answers to this homework through the Assignment link at Blackboard. **No credit will be given for answers submitted in class or emailed to the professor, regardless of the excuse.** This includes unique excuses like the police confiscated my computer right before I was going to submit it, excuses like “I lost my Internet”, etc. Please note that all submissions are final, again – regardless of the excuse (which includes “I accidentally hit the submit button”). Note that Blackboard allows you to save your answers, but you must hit the “Save and Submit” button to submit your answers. If you are unfamiliar with Blackboard, then it would be a good idea to visit the class page at Blackboard and check out the homework assignments as they are posted.*

Please note that when Blackboard grades homework answers, more specifically – answers to the fill-in-the-blank questions – your answer must match exactly with the answer that Blackboard is looking for. Below, you'll find some instructions on how to properly format these answers. Reading this section is strongly recommended.

#### **Homework Questions 1, 2, 4, 5 and 6**

Formatting matters with the answers in these questions. For this reason, **understand that your answer can be technically correct but graded as wrong because you didn't follow the directions provided below.** Given that formatting is considered part of your answer, a wrongly formatted answer is still a wrong answer.

*Please note the following comments below.*

*(a) **On Question #1, 2a, 2c, 4a, 4b, 5a and 5b**, please express your answer in terms of dollars, **not** dollars and cents. E.g., if you calculate 30.001 for your answer to one of these questions, then you should express that answer as \$30 and not \$30.00 or 30.*

*(b) **On Question #2b and 6**, please express your answer as a whole number (i.e. rounded, if necessary to the nearest whole number). E.g., if you calculate 30.25 for your answer to these questions, then you should express that answer as 30.*

*(c) **On Question #1, 2a, 2c, 4a, 4b, 5a and 5b**, please express any negative answer with the negative sign in front of the dollar sign and do not put a space between the negative sign and dollar sign, or put the negative sign between the \$ and the number itself. E.g., if you calculate an answer of -30 with one of these questions, then express that answer as -\$30, not - \$30 or \$-30.*

## Homework #4 Questions

1. Assume that a firm operates as a profit maximizing monopolist that produces and sells widgets, and that this firm has the following Demand and Marginal Revenue curves below (where  $P$  = Price,  $Q$  = Quantity).

$$\begin{aligned}\text{Demand:} & \quad P = 500 - 2Q \\ \text{Marginal Revenue:} & \quad MR = 500 - 4Q \\ \text{Average Cost:} & \quad AC = 100 \\ \text{Marginal Cost:} & \quad MC = 100\end{aligned}$$

If the firm sells widgets all for the same price (i.e. linear pricing), then the greatest possible profit that the firm can earn in this market would be equal to \_\_\_\_\_

2. Assume that an agricultural firm has a monopoly on the sale of apples to grocery stores. The equations below provide demand and cost-related information associated with selling this good:

$$\begin{aligned}\text{Demand:} & \quad P = 300 - 2.5Q \\ \text{Marginal Revenue:} & \quad MR = 300 - 5Q \\ \text{Average Cost:} & \quad AC = 100 + \left(\frac{80}{Q}\right) \\ \text{Marginal Cost:} & \quad MC = 100\end{aligned}$$

a. Let's assume apples are sold by the box, and that this firm sells every box of apples at the same price. Under this pricing strategy, the greatest possible profits the firm can earn is \_\_\_\_\_

*Assume that government passes a law that requires this firm's price to be set equal to the firm's marginal cost (i.e. requires that  $P = \$100$  for each box of apples).*

b. Under this \$100 price regulation, the firm will sell \_\_\_\_\_ boxes of apples.

c. Under this \$100 price regulation, the firm's profit is equal to \_\_\_\_\_

3. Consider the widget-selling firm from question #1 and the apple-selling firm from question #2. Given what you know about these firms, which of the following is a true statement:

- (a) the widget-selling firm and apple-selling firm are both natural monopolies
- (b) the apple-selling firm is a natural monopoly, but not the widget-selling firm
- (c) the widget-selling firm is a natural monopoly, but not the apple-selling firm
- (d) neither the apple-selling firm nor the widget-selling firm is a natural monopoly.

4. Assume that a monopolist faces the following equations below for demand, marginal revenue, average cost and marginal cost.

Demand:	$P = 500 - 2Q$
Marginal Revenue:	$MR = 500 - 4Q$
Average Cost:	$AC = 100$
Marginal Cost:	$MC = 100$

Now, assume that this firm chooses to engage in price discrimination, and considers setting 2 different prices. One price for Group 1, a group of consumers who prefer to buy this good on weekdays, and another price for Group 2, a group of consumers who prefer to buy this good on weekends. These prices are provided below:

- the weekday price for consumers in Group 1 is \$250
- the weekend price for consumers in Group 2 is \$150

Assume that consumers fit into one or the other of these two groups, based on their willingness to pay for widgets. Assume further that the firm can successfully engage in a pricing strategy of price discrimination. If the firm pursues this pricing strategy, answer the following:

- a. The profit earned from Group 1 (the group facing the \$250 price) is equal to \_\_\_\_\_
- b. The profit earned from Group 2 (the group facing the \$150 price) is equal to \_\_\_\_\_

5. Assume that a monopolist faces the following equations below for demand, marginal revenue, average cost and marginal cost.

Demand:	$P = 600 - 2Q$
Marginal Revenue:	$MR = 600 - 4Q$
Average Cost	$AC = 100$
Marginal Cost	$MC = 100$

a. If this firm sets the same price for every unit sold (i.e. linear pricing), then the firm's greatest possible profit would be equal to \_\_\_\_\_

b. Assume that this firm is considering the use of a two-part tariff. If the total profit from the two part tariff is greater than what occurs in part a, then the monopolist will switch pricing strategies.

Assume that in implementing the two part tariff, the firm sets  $P = \$100$ , and knows that they can collect all of what would be the maximum potential fixed fee revenue available at that price.

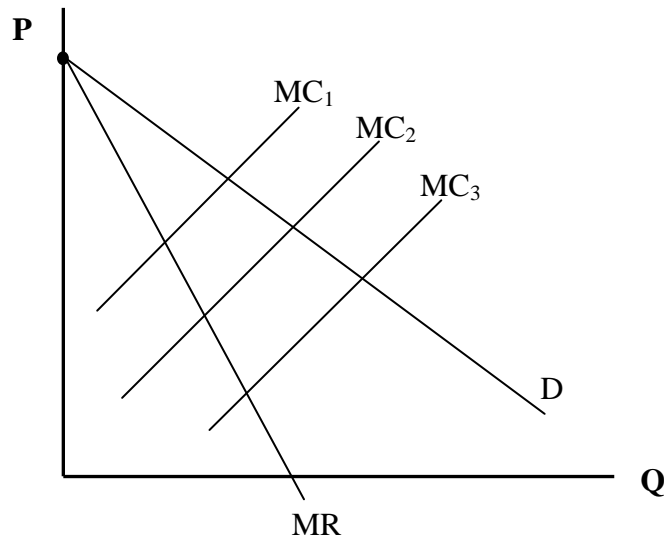
Under this two part tariff, the firm's overall profit would be \_\_\_\_\_

6. A monopolist has the following Demand and Marginal Revenue equations:

Demand:  $P = 1000 - 2Q$

Marginal Revenue:  $MR = 1000 - 4Q$

*Note that to answer this question, you may want to work with a graph before attempting any of the math that's necessary here. E.g., the graph below shows the demand and marginal revenue curves with 3 possible marginal cost curves. Consider these marginal cost curves, and how much output the firm would produce with each one, then continue drawing these curves until you find a marginal cost curve that allows the firm to produce the most possible output.*



Assume that this monopoly is a profit maximizing firm who chooses to sell every unit at the same price (i.e. linear pricing). Although you don't have the MC and AC curves, what would be the greatest quantity of output that the firm would ever produce: \_\_\_\_\_

7. This question uses the equations from Question #6. Once the firm knows their output level, the firm must set a price in order to sell those units. Again, under the assumption that the firm will sell every unit at the same price, and again, although you don't have the MC and AC curves of this firm, what would be the minimum possible price that the firm would ever set:

- (a)  $P = \$1000$
- (b)  $P = \$800$
- (c)  $P = \$750$
- (d)  $P = \$500$
- (e)  $P = \$450$
- (f)  $P = \$200$
- (g)  $P = \$100$
- (h)  $P = \$0$

8. The question below can be answered after reading the article “Should the US eliminate entry barriers to the practice of law?”. This article can be located within the Homework #4 material folder in Course Documents at Blackboard. Read the article and then answer the following question below.

Select each statement below that represents a statement made by the article (i.e. select every statement that is a point made within the article about eliminating entry barriers – this may involve selecting every statement, just one statement, two statements, etc.):

- a. State licensing requirements and American Bar Association (ABA) regulations serve as entry barriers which limit the supply of lawyers
- b. Entry deregulation in network industries spurred innovations in market, operations, and technology that improved firms’ efficiency, service quality, etc.
- c. Benefits from entry deregulation in certain industries extend beyond the industries that were deregulated
- d. There are valid reasons to expect that entry deregulation would eliminate the inefficiencies in firms’ operations
- e. Entry deregulation should be expected to increase most lawyers’ earnings premiums

The following information can be used to answer Questions #9-11.

Assume that you have two individuals, Bob and Tom, playing a game we’ll call “the tipping game”. Assume further that this game is played over just one period and that this is a game with complete information.

Our game plays out as follows. Bob and Tom have just met for lunch, and although they pay for their own meals, they must now decide whether to tip their server. Each player has a pair of strategies. Each player can leave a tip (i.e. **tip**) or walk out of the restaurant without leaving a tip for their server (i.e. **no tip**). Given those strategies, there are 4 possible outcomes in this game.

- One player could leave a tip, a tip that would have to cover both meals, while the other player leaves nothing. We’ll assume that this provides the best outcome for the player who’s able to escape tipping, but the worst outcome for the player who’s stuck with leaving a tip. Although tipping makes a player feel good about being nice, getting stuck with the whole tip makes a player feel like they’ve been taken advantage of.
- Both players leave a tip. In addition to feeling good about sharing the cost of the tip, both players also feel pretty good about doing something nice.
- Both players leave without paying a tip. While leaving the restaurant without leaving any tip at all makes a player feel like a chump, both players feel better about themselves when it’s both of them making the same decision and one player doesn’t get left with a big tip.

Given the outcomes outlined above, here are the payoffs for those four outcomes.

**Outcome 1:** Bob chooses tip and Tom chooses tip, giving Bob 5 units of net benefit and Tom 5 units of net benefit

**Outcome 2:** Bob chooses tip and Tom chooses no tip, giving Bob 1 units of net benefit and Tom 6 units of net benefit

**Outcome 3:** Bob chooses no tip and Tom chooses tip, giving Bob 4 units of net benefit and Tom 1 units of net benefit

**Outcome 4:** Bob chooses no tip and Tom chooses no tip, giving Bob 2 units of net benefit and Tom 2 units of net benefit

*Given the information above, determine the outcome of the games described in Questions #9-11 (note that there are diagrams on the final page that you can use with these questions).*

9. What will be the outcome if this is played as a **simultaneous game**?

- (a) Bob will choose **tip**, and Tom will choose **tip** (Outcome #1)
- (b) Bob will choose **tip**, and Tom will choose **no tip** (Outcome #2)
- (c) Bob will choose **no tip**, and Tom will choose **tip** (Outcome #3)
- (d) Bob will choose **no tip**, and Tom will choose **no tip** (Outcome #4)

Assume now that this game is played as a one period sequential game (rather than as a simultaneous game) with complete information and that the players will make choices which maximize their own net benefit. We'll use the questions below to determine whether we get the same outcome with Bob as the first mover, vs. when Tom is the first mover.

10. What is the outcome if this game is played as a **sequential game with the Bob moving first**?

- (a) Bob will choose **tip**, and Tom will choose **tip** (Outcome #1)
- (b) Bob will choose **tip**, and Tom will choose **no tip** (Outcome #2)
- (c) Bob will choose **no tip**, and Tom will choose **tip** (Outcome #3)
- (d) Bob will choose **no tip**, and Tom will choose **no tip** (Outcome #4)

11. Utilizing the information from above, what is the outcome if this is played as a **sequential game with the Tom moving first**?

- (a) Bob will choose **tip**, and Tom will choose **tip** (Outcome #1)
- (b) Bob will choose **tip**, and Tom will choose **no tip** (Outcome #2)
- (c) Bob will choose **no tip**, and Tom will choose **tip** (Outcome #3)
- (d) Bob will choose **no tip**, and Tom will choose **no tip** (Outcome #4)

As an aid, the figures which go with Questions #9-11 are also provided on the next page.  
 Note that you can use the figures below to answer each question.

9)

		Tom	
		Tip	No tip
Bob	Tip	$NB_B, NB_T$ 5, 5	$NB_B, NB_T$ 1, 6
	No tip	$NB_B, NB_T$ 4, 1	$NB_B, NB_T$ 2, 2

