Handout 10

Topics

- Monopoly
- Selective exam questions, review

Review: Monopoly

- **Monopoly setting:** single firm industry, no entry or exit, no close substitutes, barriers to entry; Firm Demand = Market Demand
- Moreover, a monopolist decides on how much to produce, how to produce, how much input to demand and what price to charge.
- **Barriers to entry:** if the monopolist is making positive profits, then in the long run, other firms would want to enter the industry. But they might not be able to because of
  (i) Government Directives
  (ii) Economies of Scale (Natural Monopoly)
  (iii) Patents
  (iv) Ownership of scarce factor of production
- If the Average Revenue (AR) of a monopolist is linear, then if (Demand or) $AR : P = a - bQ \implies MR : P = a - 2bQ$, where MR is Marginal Revenue.
- **Profit maximization steps:**
  (i) Monopolist sets $MC = MR$ and obtains the optimal quantity to produce, Q^*.
  (ii) At Q^*, read off the demand or AR curve to obtain the price to be set, P^*.
  (iii) Total profits $= (AR - AC) \cdot Q^*$.
- A market with a monopolist underproduces than it would with perfect competition. A monopolist restricts output, charges higher prices and earns positive profits relative to a perfectly competitive industry.
- There is a deadweight loss associated with that underproduction. It is referred to as the excess burden of a monopoly.

- Being a monopoly doesn't guarantee positive profits. Knowing the monopolist's costs is necessary to make that claim. A monopolist firm also shuts down if $P < \min AVC$.
- A monopolist **never** operates on the inelastic part of the demand. This is because in the inelastic part (of a downward sloping demand), it can always reduce quantity and increase total revenue (refer to the elasticity chapter!) while decreasing total costs, and thereby increasing its profit. Thus, no point in the inelastic part **maximizes** the firm's profits.
- While the unit elastic part of the firm's demand maximizes Total Revenue (again, recall Chapter 5), it maximizes Total Profits only when $MC = 0$ (unlikely scenario).
- Thus, a monopolist only operates on the elastic part of its demand.

Monopoly Exercises

Exercise 1 A monopoly firm operates under cost structure and faces with market demand as summarized by the information in the below table.

Quantity	Price	Total Revenue	Marginal Revenue	Total Cost	Marginal Cost
0	200	0		100	
1	180			130	
2	170			170	
3	160				50
4		600	120		60
5	140		100		70
6		780		430	
7		840		520	
8		800		620	

1. Complete the missing values in this table. What is the profit maximizing level of output? What is the profit-maximizing profit?

2. What is the social desirable output and price? How much profit does firm get under this socially desirable outcome?

Exercise 2

Consider a monopoly that produces widgets. Suppose you are told that the monopoly has the following cost curves where TC is total cost measured in dollars, Q is the quantity of widgets, and P is the price per widget in dollars and the following demand curve:

$$TC = 4 + 4Q + Q^2$$
$$MC = 4 + 2Q$$
$$P = 19 - (1/2)Q_D$$

1. Given the above information, what is this monopolist's equation for MR?

2. Determine the profit maximizing level of production for this monopolist as well as the price that will be charged for each unit of the good. Assume that this is a single price monopolist, i.e. the monopolist cannot engage in price discrimination. Explain how you found your answer.

3. Given the above information and your answer in (2) calculate the level of profit in the short- run for this monopolist. Explain how you found your answer.

4. Given your answer in (3), what do you predict will happen to this monopolist in the long-run?

5. Calculate the deadweight loss that results from this market being served by a monopolist. Show how you found your answer. Provide a graph that is well labeled to illustrate your answer.

Multiple Choice Exercises

Use the following information to answer all multiple choice questions

Consider the market for signed Phoebe Bridgers records. Phoebe has a unique signature that cannot be replicated by anybody else, so she has a monopoly on signed records. However, she has to buy pens and records, and the time she spends signing records could be spent making new music, going on tour, or building her burgeoning recording studio empire, so signing records comes at a cost. Specifically, Phoebe has total cost function $TC = 100 + q^2$ and marginal cost function $MC = 2q$.

1. Suppose that Phoebe has taken an economics course but never learned about monopoly, so she prices signed records as if she were in a perfectly competitve market. If demand for signed Phoebe Bridgers records is $P_D = 100 - 2Q_d$, what price would she charge, and how many signed records would she sell?

   (a) $P = 20$, $Q = 10$
   (b) $P = 80$, $Q = 10$
   (c) $P = 50$, $Q = 25$
   (d) $P = 25$, $Q = 50$

2. Now suppose that Phoebe's friend and fellow musician Julien, who has been reading economics textbooks in her spare time, teaches Phoebe about monopolies. What price will Phoebe charge to maximize her profit, and how many signed records will she sell at that price?

   (a) $P = 68$, $Q = 16$
   (b) $P = 50$, $Q = 25$
   (c) $P = 80$, $Q = 10$
   (d) $P = 60$, $Q = 20$

3. What is the deadweight loss in the market for signed Phoebe Bridgers records that is caused by Julien sharing her knowledge of monopolies with Phoebe?

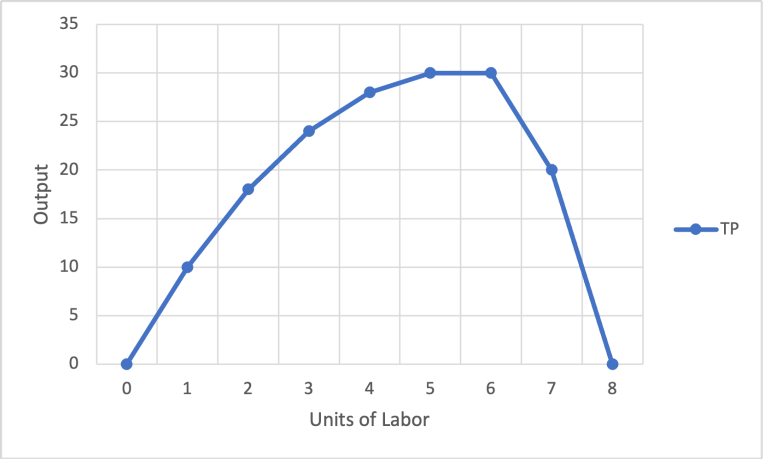
   (a) $450
   (b) $81
   (c) $364
   (d) $162

4. Suppose that then-candidate Joe Biden vowed that he would minimize all deadweight loss from musicians' monopolies on signed records. What price ceiling should President-elect Biden enact to minimize deadweight loss from Phoebe's monopoly?

   (a) $50
   (b) $25
   (c) $0
   (d) $68

Difficult Exam Questions

1. Question 13: The graph below describes the Total Product (TP) of labor for a firm. Use this graph to answer the question:



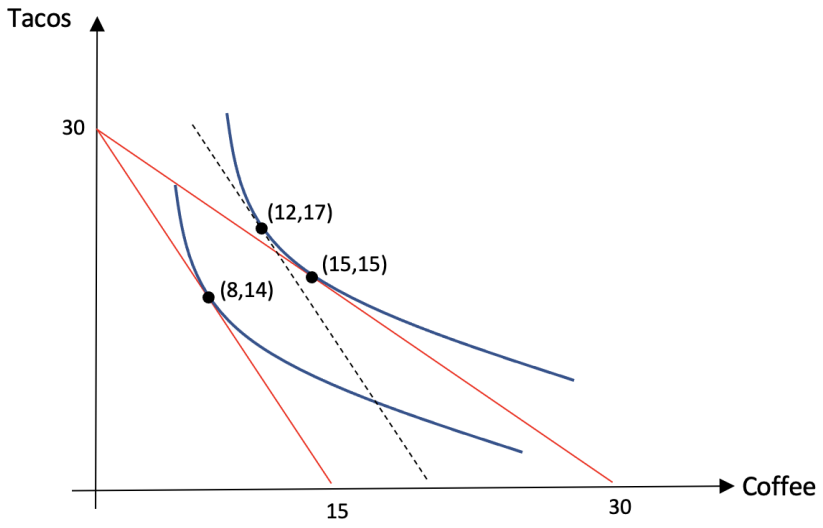
   I. The graph is consistent with the law of diminishing marginal returns.

   II. The MPL curve is constant.

   III. The MPL curve intersects with the APL curve somewhere between 2 and 6 units of labor.

      a. I only.
      b. I and II only.
      c. I and III only.
      d. All of the above.

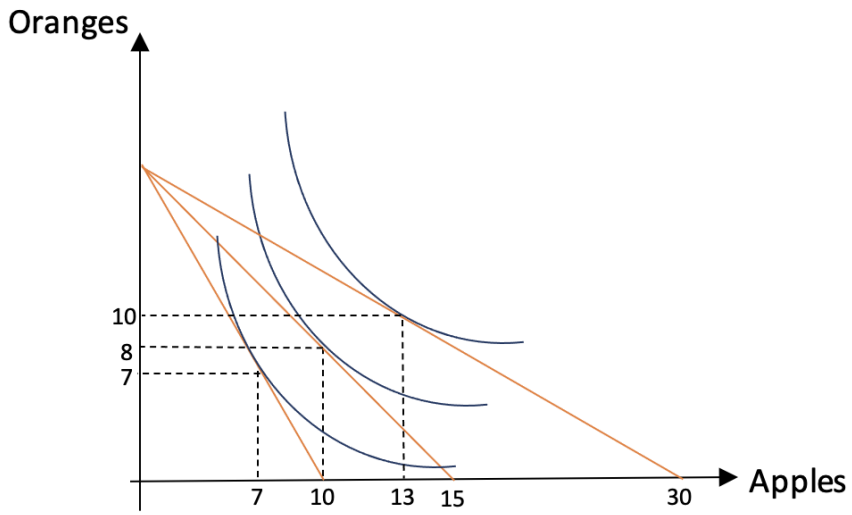
Use the information below to answer questions 4-6. Like most economics graduate students, Danny consumes truly egregious amounts of coffee. However, he cannot live off of coffee alone, so he also consumes tacos. The chart below displays Danny's consumption behavior before and after a price change. Danny's income is $60 and he consumed 15 cups of coffee and 15 tacos before the price change.



2. Question 6: Suppose that Professor Hansen recognizes Danny's need for coffee and wants to pay him to offset the price change. How much would Professor Hansen have to pay Danny in order to make him as happy as he was before the price change?

   a. $22
   b. $30
   c. $15
   d. $18

Use the information below to answer questions 1-3. Jamelle consumes apples (x) and oranges (y). The graph below displays Jamelle's consumption of apples and oranges when the price of apples is $1, $2, and $3.



3. Question 2: What is the substitution effect for oranges when the price of apples increases from $1 to $2?

   a. Impossible to determine.

   b. -1

   c. -2

   d. 2

Use the information below to answer questions 20-23.

Archaeologists excavating at Persepolis, a city of The Achaemenid Empire, have stumbled upon a document during their expedition. They are of the belief that the document represents daily cost estimates of a small profit-maximizing perfectly competitive firm that made clay pots. Since some information on the document has faded away, you are asked to help make sense of the document presented below. Costs are expressed in the local currency, Daric (D).

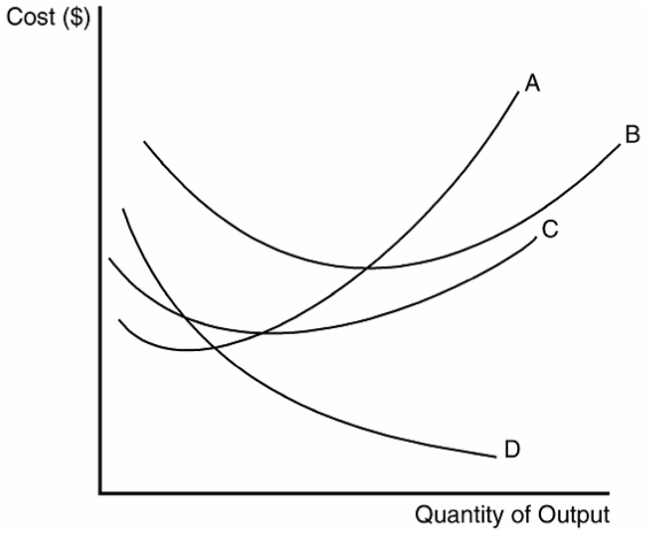
Quantity	Marginal Cost	Average Fixed Cost	Average Variable Cost	Average Total Cost	Total Cost
0	–	–	–	–	10
1	26				
2	16				
3	18				
4					100

4. Question 23: How would the firm react if the market price changed to 18 D in the short run?

   a. Shut down operations.
   b. Reduce production to 3 units.
   c. Reduce production to 2 units.
   d. Reduce production to 1 unit.

Use the information below to answer questions 11-12.

The curves below reflect information on the cost structure of a firm.



5. Question 12: Curve A is U-shaped (first decreasing, then increasing) because of

   a. the fact that decreasing marginal product follows increasing marginal product.
   b. economies of scale
   c. constant returns to scale
   d. diminishing marginal product

Use the information below to answer questions 26-27.

Suppose the market for computers is perfectly competitive. There are 24 identical firms in the market and each firm has cost functions as follows:

$$TC = q + 3q^2 + 34$$
$$MC = 1 + 6q$$

The demand for computers is given by

$$P = 86 - Q$$

6. Question 27: In the long run, the number of firms in the market

   a. would decrease.
   b. would increase.
   c. would remain unchanged.
   d. may increase, decrease, or remain unchanged.

Use the information below to answer question 29.

Phoebe hires musicians (L), and purchases studio equipment (K) to produce indie records that sell at $2 each. The table below displays the marginal product of labor that Phoebe faces, as she hires musicians (L).

L	MP_L	
1	2	
2	5	
3	10	
4	8	
5	6	
6	4	

7. Question 29: If the musician's wage is \$10, how many musicians should Phoebe hire to maximize her profit?

   a. 5

   b. 2

   c. 1

   d. 4

Use the information below to answer questions 16-19.

Suppose that the hotdog stand industry in Madison is perfectly competitive with identical firms. Each firm's costs are summarized as follows:

$$TC = 3q^2 + q + 12$$
$$MC = 6q + 1$$

The demand for computers is given by

$$P = 17 - Q$$

8. Question 18: Calculate the profits for the representative competitive firm in the short run.

   a. \$0

   b. -\$12

   c. \$12

   d. \$26