# Handout 11

## Topics

- Monopoly
- First and third degree price discrimination*
- Midterm 2 - Discussion of most missed questions

## 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.

## Review: Price Discrimination*

- **First degree PD:** monopolist knows the willingness to pay (WTP) of each consumer and charges consumers prices equal to their WTP; as a result, CS equals zero.
  - When $MC = AC$ is constant, monopolist sets prices such that the demand curve acts as the MR and produces $Q_{PC}$ – which is the efficient outcome. Hence, there is no DWL.
  - In this case, assuming linear demand, the total profits by a monopolist is given by the area of the triangle that lies between the demand and the MC curves.
- **Third degree PD:** monopolist charges different groups of consumers different prices.
  - **Problem-solving steps:** separate demand equations are given for different groups of consumers. You follow the same profit maximization steps as for a monopolist, but separately for each consumer group, i.e. for each group, you first set $MR = MC$ to get $Q_M$, then use the corresponding demand to get $P_M$.

## 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.

## First degree price discrimination Exercise*

**Exercise 3**

Suppose a monopoly is a first-degree price discriminator in the market for cell phones. Cell phone demand is given by $Q = 100 - P$. The monopoly's marginal cost is $MC = 20$.

1. What are the monopoly's profits if it practices first degree price discrimination? Are these higher or lower than when the monopoly cannot price discriminate?

2. What is consumer surplus in this market when the monopoly practices first degree price discrimination? Is this higher or lower compared to the situation where the monopoly cannot price discriminate?

3. What is dead weight loss in this market when the monopoly practices first degree price discrimination? Is this higher or lower than when the monopoly cannot price discriminate?

## Third degree price discrimination Exercise*

**Exercise 4**

Suppose there is only one airline to serve a certain local airport. The airline serves both students and the general public. The airline's marginal cost is given by $MC = 20$. Suppose the student demand is given by $P = 120 - Q$ and the general public demand is given by $P = 200 - Q/4$. What price should the airline charge each group for tickets?What is this monopolist's total profit?

## 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