



INDUSTRIAL ECONOMICS

MIDTERM EXAM

April 2026

LAST NAME:

FIRST NAME:

ANSWER ALL THE QUESTION IN BOTH PARTS A & B.

PROVIDE YOUR ANSWERS IN THE SPACE BELOW EACH QUESTION

- 1.** Multiple Choice Question: Which of the following is true under first degree price discrimination by a monopolist?
- a. Consumer surplus is maximized.
 - b. Producer surplus is minimized
 - c. There is no deadweight loss.**
 - d. Lower total quantity is produced than in perfect competition.
 - e. None of the above.

Choice & Explanation:

Under 1st degree price discrimination, the monopolist produces the perfect competition quantity - so there is no deadweight loss.

However, it extracts all the consumer surplus. The maximum possible producer surplus.

2. Assume that in a small university town there is only one cinema. The total cost of the cinema is zero. Demand for cinema tickets by university students is $Q_s = 220 - 40P_s$. Demand for cinema tickets by non-students is $Q_n = 140 - 20P_n$. The cinema charges a different price for cinema tickets to students and to non-students. Find the price that it charges to students and the price it charges to non-students.

Solution (Show the process/calculations that you make):

STUDENTS

$$Q_s = 220 - 40P_s \quad \rightarrow \quad P_s = \frac{220}{40} - \frac{Q_s}{40}$$

$$= 5,5 - 0,025 Q_s$$

$$TR_s = P_s(Q_s) * Q_s = (5,5 - 0,025 Q_s) * Q_s$$

$$MR_s = \frac{\partial TR_s}{\partial Q_s} = 5,5 - 0,05 Q_s$$

$$MC = 0 \quad \rightarrow \quad MR_s = MC$$

$$\rightarrow 0,05 Q_s = 5,5 \quad \rightarrow \quad Q_s = \frac{5,5}{0,05} = 110$$

$$P_s = 5,5 - 0,025(110) \quad \rightarrow \quad \boxed{P_s = 2,75}$$

NON-STUDENTS

$$Q_n = 140 - 20P_n \quad \rightarrow \quad P_n = \frac{140}{20} - \frac{Q_n}{20}$$

$$= 7 - 0,05 Q_n$$

$$TR_n = (7 - 0,05 Q_n) * Q_n$$

$$MR_n = \frac{\partial TR_n}{\partial Q_n} = 7 - 0,1 Q_n \quad \rightarrow \quad Q_n = 70$$

$$P_n = 7 - 0,05(70) \quad \rightarrow \quad \boxed{P_n = 3,5}$$

3. Two firms produce a specialized microchip used in certain home appliances. Market demand for their homogeneous product is given by $Q = 100 - 2p$. The two firms choose their **prices** simultaneously and separately. Whichever firm sets the lowest price gets all of the demand, if they set the same price then they share the demand. Find their prices when (i) both firms have marginal cost equal to 37, and (ii) when firm 1 has marginal cost 20 while firm 2 has marginal cost 37.

Solution (Show the process/calculations that you make):

(i)

Bertrand (symmetric costs / homogeneous product)
 just like in the typical/standard
 Bertrand model → "Bertrand paradox"
 → Nash equilibrium: $(p_1^*, p_2^*) = (MC, MC)$
 $= (37, 37)$

(ii)

Asymmetric costs; Is the asymmetry large or small??
 If 1 was a monopolist:
 $\text{Max}_p \pi = (100 - 2p) - 20(100 - 2p) - 520$
 $\frac{\partial \pi}{\partial p} = 100 - 4p + 40 = 0 \rightarrow p_1^M = 35 < 37$
 so "large asymmetry"

Since the asymmetry is large, in equilibrium:

- Firm 1 will set $p_2 = 35$
- Firm 2 will set $p_1 = 37$

4. Market demand for printing paper is given by $P = 400 - 2Q$, where Q is the total quantity. There are 5 firms in the market that produce printing paper. The total cost of each firm i is $C(q_i) = 40q_i$, where q_i is the quantity of firm i , with $i = 1, 2, 3, 4, 5$. The 5 firms choose their **quantities** simultaneously and separately. Find the equilibrium quantity of each firm.

Solution (Show the process/calculations that you make):

Count with $n = 5$ symmetric firms

Each firm i , with $i = 1, 2, 3, 4, 5$ solves:

$$\text{Max } \pi_i = (400 - 2q_i - 2Q_{-i})q_i - 40q_i$$

FOC: $\frac{\partial \pi_i}{\partial q_i} = 400 - 4q_i - 2Q_{-i} - 40 = 0$

$$\rightarrow q_i = \text{BR}_i(Q_{-i}) = \frac{360 - 2Q_{-i}}{4}$$

We have 5 similar Best Response functions. Since firms are symmetric we know that in equilibrium:

$$q_1^* = q_2^* = \dots = q_5^*$$

$$\rightarrow q_i^* = \frac{360 - (n-1)2q_i^*}{4} = \frac{360 - 8q_i^*}{4}$$

$$\rightarrow 4q_i^* = 360 - 8q_i^* \rightarrow 12q_i^* = 360$$

$$\rightarrow q_i^* = \frac{360}{12} \rightarrow \boxed{q_i^* = 30}$$