

ECN 453: Final Exam (Practice)

Instructions:

- You have **110 minutes**
- Please write your final answer in the underlined section provided.
- You may bring a calculator and notes on a two-sided cheat-sheet on letter-size paper.
- Please be neat. If your work is too messy it will not be graded.
- Be sure to show your working.
- This is a long exam, so there are lots of ways to get points. If you get stuck, move on!
- Good luck!

Name: _____

Question:	1	2	3	4	5	6	Total
Points:	0	0	0	0	0	0	0
Score:							

Short Answer Questions (45 points)

1. Depending on the question, write either:

- a number
 - one of: True, False, or NEI (Not Enough Information)
 - a definition (i.e. one or a few words)
- (a) Commitment Problem
(b) Profits are higher
(c) Decrease
(d) Increase
(e) True
(f) True
(g) 3750
(h) NEI
(i) 0
(j) 8
(k) Higher entry costs in USA due to advertising.
(l) 1
(m) True
(n) Too much market power for merged firm.
(o) Cost efficiencies

Movie Theater Question (30 points)

2. Suppose you are the owner of a movie theater. There are two types of customers: students (denoted 's') and non-students (denoted 'ns'). The demand for movie seats for each of these segments is:

$$\text{Student: } q_s = 75 - 2p_s$$

$$\text{Non-student: } q_{ns} = 80 - p_{ns}$$

- Let $q_s + q_{ns} = q$, and $p_s = p_{ns} = p$

Given the individual demand curves for students and non-students, observe that if $p \geq 37.5$, then only non-students will buy tickets.

Then demand is:

$$q = 80 - p \text{ if } p \geq 37.5$$

$$q = 155 - 3p \text{ if } p < 37.5$$

Marginal revenue is:

$$MR = 80 - 2q \text{ if } p \geq 37.5$$

$$MR = \frac{155}{3} - \frac{q}{3} \text{ if } p < 37.5$$

Assuming marginal cost = 15; optimal quantities:

Case 1: $p \geq 37.5$

$$80 - 2q = 15 \implies q = 32.5 \implies p = 47.5$$

$$\text{Profits} = 47.5 \times 32.5 - 32.5 \times 15 = 1056.25$$

Case 1: $p < 37.5$

$$\frac{155}{3} - \frac{q}{3} = 15 \implies q = 110 \implies p = 15$$

$$\text{Profits} = 110 \times 15 - 15 \times 15 = 1425$$

The Firm will choose Case 2.

Stackelberg Competition (30 points)

3. There are two firms in a market with total demand $p = 100 - 2Q$. Firm 1 moves first and Firm 2 moves second. Firm 1's total cost is $C(q_1) = 1 + 2q_1^2$. Firm 2's total cost is $C(q_2) = 0$.

- (a) Profits for Firm 2:

$$\pi_2 = q_2(100 - 2q_1 - 2q_2)$$

$$\frac{d\pi_2}{dq_2} = 0 \implies 100 - 2q_1 - 4q_2 = 0$$

$$\implies q_2 = 25 - \frac{1}{2}q_1$$

Problem of Firm 1:

$$\pi_1 = q_1(100 - 2q_1 - 2q_2) - 1 - 2q_1^2$$

$$\pi_1 = q_1(50 - q_1) - 1 - 2q_1^2$$

$$\frac{d\pi_1}{dq_1} = 0 : 50 - 6q_1 = 0 \implies q_1 = \frac{50}{6}$$

Hotelling Model (30 points)

4. Suppose 100 consumers are uniformly distributed on a 1 mile stretch of road. There are two supermarkets on the road: Supermarket 1 is located at the west end of the road (at location = 0), and Supermarket 2 is part way along the road (at location = 0.3). Transport costs for consumers are \$1.0 per mile. The supermarkets' marginal costs are 0. The supermarkets compete on prices: denote Supermarket 1's price p_1 and Supermarket 2's price p_2 .

- (a) Marginal Consumer:

$$p_1 + x = p_2 + (0.3 - x)$$

$$\implies x = \frac{p_2 - p_1}{2} + 0.15$$

Demands:

$$q_1 = 100(0.15 + \frac{p_2 - p_1}{2})$$

$$q_2 = 100(0.85 + \frac{p_1 - p_2}{2})$$

(b) Firm 1's Problem:

$$\begin{aligned}\pi_1 &= (100(0.15 + \frac{p_2 - p_1}{2}))p_1 \\ \frac{d\pi_1}{dp_1} &= 0 : 0.15 + \frac{p_2}{2} - p_1 = 0 \\ \implies p_1 &= 0.15 + \frac{p_2}{2} \\ p_2 = 0.2 &\implies p_1 = 0.25\end{aligned}$$

Collusion (30 points)

5. Consider the following game and suppose that it is repeated an infinite number of times. Players have a discount value of δ .

		Player 2	
		L	R
		8	9
Player 1	T	8	0
	B	0	1
		9	1

(a) Payoff under (T,L):

$$8 + \delta 8 + \delta^2 8 + \delta^3 8 + \dots = \frac{8}{1 - \delta}$$

Payoff under deviation:

$$9 + \delta + \delta^2 + \delta^3 + \dots = 9 + \frac{\delta}{1 - \delta}$$

In order for the strategy to be sustained we need:

$$\frac{8}{1 - \delta} \geq 9 + \frac{\delta}{1 - \delta} \implies \delta \geq \frac{1}{8}$$

Vertical Relationships (30 points)

6. Suppose that there are two firms in a supply chain: a manufacturer who sells to a retailer. The timing is as follows:

1. Manufacturer has a constant marginal cost $c = 1$ and sets input price w to maximize profit.
2. Retailer buys input from manufacturer for price w . Retailer sets price p to maximize profit with demand $D(p) = 8 - p$.

(a) Retailer's problem:

$$\begin{aligned}MR &= MC \implies 8 - 2q = w \\ \implies q &= \frac{8 - w}{2}\end{aligned}$$

Manufacturer's problem:

$$\begin{aligned}\pi_m &= (w - c)q = (w - 1)\left(\frac{8 - w}{2}\right) \\ \frac{d\pi_m}{dw} &= 0 : w = 3.5\end{aligned}$$

Then,

$$\pi_m = (3.5 - 1)2.25 = 5.625 \pi_r = (8 - 3.5 - 2.25)2.25 = 5.0625$$

- (b) Under vertical separation the retailer's price is too high due to double marginalization.