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 two, two-sided cheat-sheets, 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 or brief explanation (i.e. one or a few words)

   (a) Hold-up problem
   (b) E.g. eliminate double marginalization
   (c) Decrease
   (d) Increase
   (e) True
   (f) True
   (g) 3750
   (h) $\frac{p-MC}{p}$
   (i) 0
   (j) 8
   (k) Endogenous entry costs
   (l) 1
   (m) True
   (n) Market power
   (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:

$$\text{Student: } q_s = 75 - 2p_s$$
$$\text{Non-student: } q_{ns} = 80 - p_{ns}$$

   (a) 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:

$$MR = 80 - 2q \text{ if } q < 42.5$$
$$MR = \frac{155}{3} - \frac{2q}{3} \text{ if } q > 42.5$$

   Assuming marginal cost = 15; optimal quantities:

Case 1: $q < 42.5$

$$80 - 2q = 15 \implies q = 32.5 \implies p = 47.5$$
$$\text{Profits} = 32.5 \times 47.5 - 32.5 \times 15 = 1056.25$$

Case 1: $q > 42.5$

$$\frac{155}{3} - \frac{2q}{3} = 15 \implies q = 55 \implies p = 33.33$$
$$\text{Profits} = 55 \times 33.33 - 55 \times 15 = 1008.15$$

The Firm will choose Case 1.

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:

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

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

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

(a) Payoff under (T,L):

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

Payoff under deviation:

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

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:

$$MR = MC \implies 8 - 2q = w$$
$$\implies q = \frac{8-w}{2}$$

Manufacturer's problem:

$$\pi_m = (w - c)q = (w - 1)(\frac{8 - w}{2})$$
$$\frac{d\pi_m}{dw} = 0 : w = 4.5$$

Then,

$$\pi_m = (4.5 - 1)1.75 = 6.125$$
$$\pi_r = (6.25 - 4.5)1.75 = 3.0625$$

So, joint profits are: 9.1875.

(b) Joint profits will be higher under vertical integration. Under vertical separation the retailer's price is too high due to double marginalization.