Short Answer Questions (30 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) (3 points) A monopolist faces the constant elasticity demand curve $p = 7q^{1/-2}$ and has a constant marginal cost = 2. What is the optimal price?

   (a) 4

   (b) (3 points) The *centipede game* that we discussed in class is often used as an example of a game that violates *which assumption* when played in real-world experimental settings?

   (b) rationality

   (c) (3 points) Suppose that a monopolist has the cost $C(q) = 10 + 2q^2$ and the perfect competition price and quantity is at $p_{pc} = 8, q_{pc} = 2$. What subsidy will the regulator need to provide the monopolist to ensure it does not shutdown under *marginal cost pricing*?

   (c) 2

   (d) (3 points) True, False, or Not Enough Information: dead-weight-loss is always eliminated by average-cost pricing.

   (d) False

   (e) (3 points) True, False, or Not Enough Information: if there is a dominated strategy in a game with two players and two strategies per player, then there is *always* a dominant strategy.

   (e) True

   (f) (3 points) True, False, or Not Enough Information: consumer surplus always decreases when moving from uniform pricing to price discrimination.

   (f) False

   (g) (3 points) A monopolist faces a constant price elasticity demand curve, has a constant marginal cost of 2, and is optimally setting a price of 5. What is the price elasticity of demand?

   (g) $-\frac{5}{3}$

   (h) (3 points) In the case *FTC vs. Facebook* that we discussed in class, the FTC is seeking *what remedy* to Facebook's ownership of Instagram and Whatsapp?

   (h) divestment

   (i) (3 points) True, False, or Not Enough Information: given two markets, a monopolist will charge a higher *price-cost margin* in a market with more elastic demand.

   (i) False

   (j) (3 points) True, False, or Not Enough Information: dead-weight-loss is zero under perfect price discrimination.

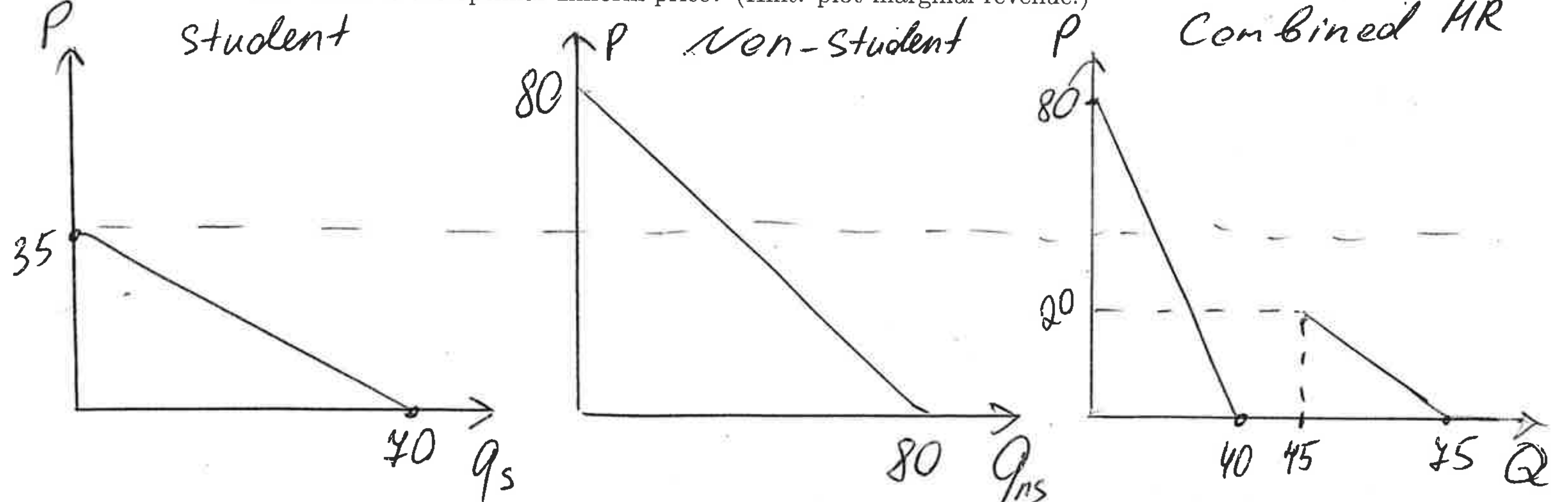
   (j) True

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:

$$\text{Student: } q_s = 70 - 2p_s$$
$$\text{Non-student: } q_{ns} = 80 - p_{ns}$$

(a) (20 points) Assume that you cannot distinguish between students and non-students, and so you can only set a single *uniform price* for all consumers. Assume that the marginal cost of a seat is \$16. What is the optimal uniform price? (Hint: plot marginal revenue.)



Demand:

$Q = 80 - p$ if $p \geq 35$

$Q = 150 - 3p$ if $p < 35$

Marginal Revenue:

$MR = 80 - 2Q$ if $Q < 45$

$MR = 50 - \frac{2}{3}Q$ if $Q > 45$

Plotting MR, note that MC intersects at two points

If $Q < 45$:

$MR = MC \Rightarrow 16 = 80 - 2Q$

$\Rightarrow Q = 32$ and $P = 48$

$\Rightarrow$ Profit $= 1024$

If $Q > 45$:

$MR = MC \Rightarrow 16 = 50 - \frac{2}{3}Q$

$\Rightarrow Q = 51$ and $P = 33$

$\Rightarrow$ Profit $= 867$

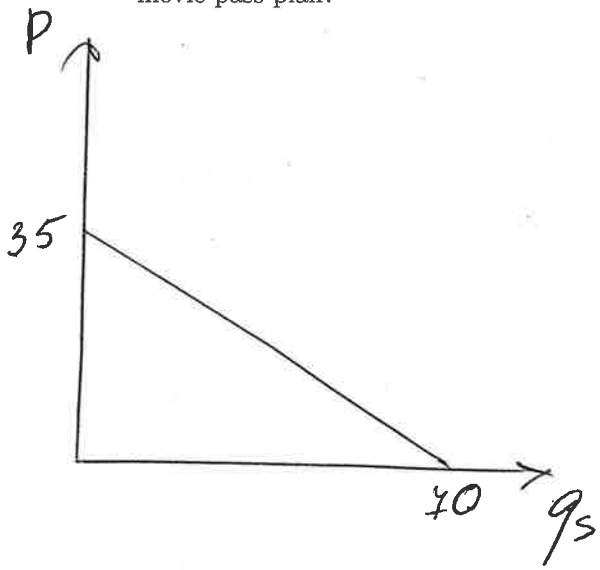
Choose $p = 48$.

[Note: half points awarded if you answered $p = 33$]

(a) 48

(b) (10 points) Suppose that there are only (identical) students in the market, and that the interpretation of the demand curve for students is now *how many* tickets each student demands. Assume that the marginal cost of a seat is \$2.

You would like to offer a 'movie-pass' plan where each customer pays a fixed fee and then can watch as many movies as they want (i.e. at a variable price = 0). What is the optimal fixed fee for the movie-pass plan?



Fixed Fee = CS (price = 0)

$= \frac{1}{2} \cdot 40 \cdot 35$

$= 1225$

(b) 1225

Price Discrimination By Self-Selection (30 points)

3. Suppose you are the CEO of an airline and there are two segments of airline ticket consumers: business and tourists. Marginal cost = \$20 per seat.

   There are two types of tickets: standard and restricted, where a restricted ticket has limitations about when/where it can be used (and so we can think of it as a 'damaged' good). The number of consumers and willingness-to-pay for each consumer is given in the following table:

Consumer type	**Number of consumers**	**Willingness to pay (\$)**	
		Standard	Restricted
Business	10	135	70
Tourist	40	60	40

   (a) (5 points) What is the profit under perfect price discrimination?

$$\text{Profit} = (135-20)\times 10 + (60-20)\times 40$$
$$= 1150 + 1600$$
$$= 2750$$

(a) 2750

   (b) Assume that you cannot distinguish between business and tourist consumers.

      i. (10 points) If you can only offer the standard ticket, what is the optimal uniform price?

Check $p = 135$:

$$\text{Profit} = 10 \times (135-20) = 1150$$

Check $p = 60$:

$$\text{Profit} = 50 \times (60-20) = 2000$$

i. 60

ii. (10 points) Suppose that you offer both tickets and charge \$40 for the restricted ticket. What is the optimal price for the standard ticket?

	S	R
B	$135-p$	30
T	$60-p$	0

- B buys standard ticket if $135-p \geq 30 \Rightarrow p \leq 105$
- Highest price possible where $p \leq 105$ is equal to 105.

- Check $p=105$

$Profit = 105 \times 10 - 20 \times 10 + (40-20) \times 40 = 1650$

- Check $p=60$

$Profit = 50 \times (60-20) = 2000$

$2000 > 1650 \Rightarrow p = 60$

ii. 60

iii. (5 points) Suppose that you offer both tickets and charge \$80 for the restricted ticket. What is the optimal price for the standard ticket?

- Neither B or T buy restricted ticket
- So, we are back in part (i)
- Charge $p = 60$

iii. 60

Game Theory: Entry Deterrence (30 points)

4. Consider the following game with two players: an Entrant and an Incumbent. The strategies of the Entrant are to enter 'E' or don't enter 'DE'. The strategies of the Incumbent are to retaliate 'R' or don't retaliate 'DR'. In the payoffs, 'x' represents a number.

Incumbent

Entrant	DR	R
DE	70 0	70 0
E	10 - x 10	-10 -10

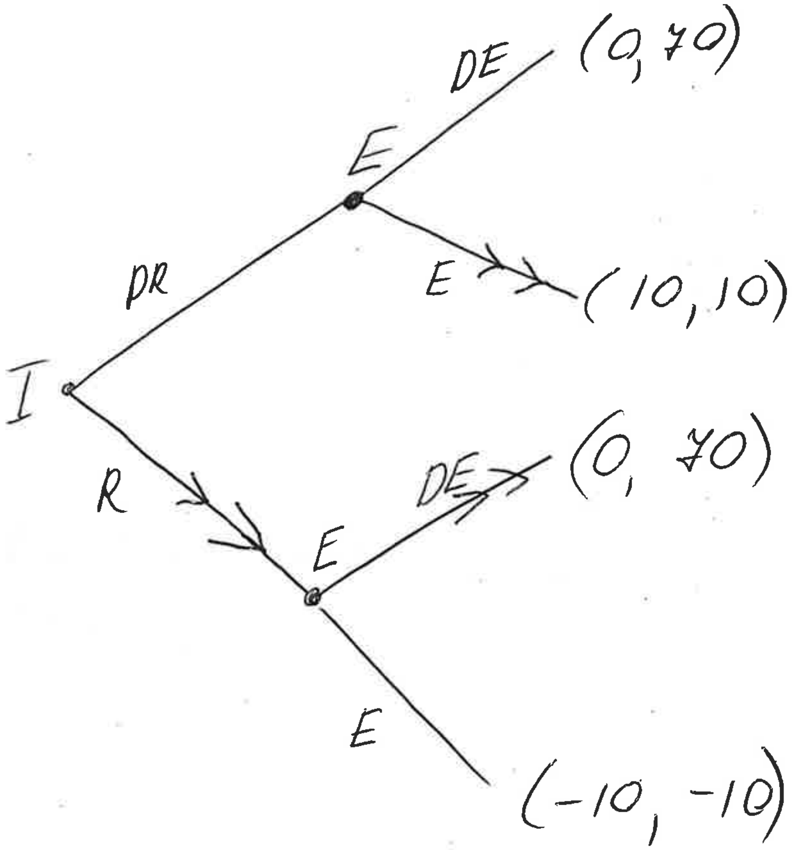
(a) (5 points) Assume that $x = 0$. What are all the Nash equilibria?

	DR	R
DE	70 0	70 0
E	10 10	-10 -10

Nash equilibria: (DE, R)
(E, DR)

(DE, R)
(a) (E, DR)

(b) (10 points) Assume that $x = 0$ and that the players play (E, DR) in the simultaneous game. What is the maximum value that the Incumbent would pay to commit to moving first?

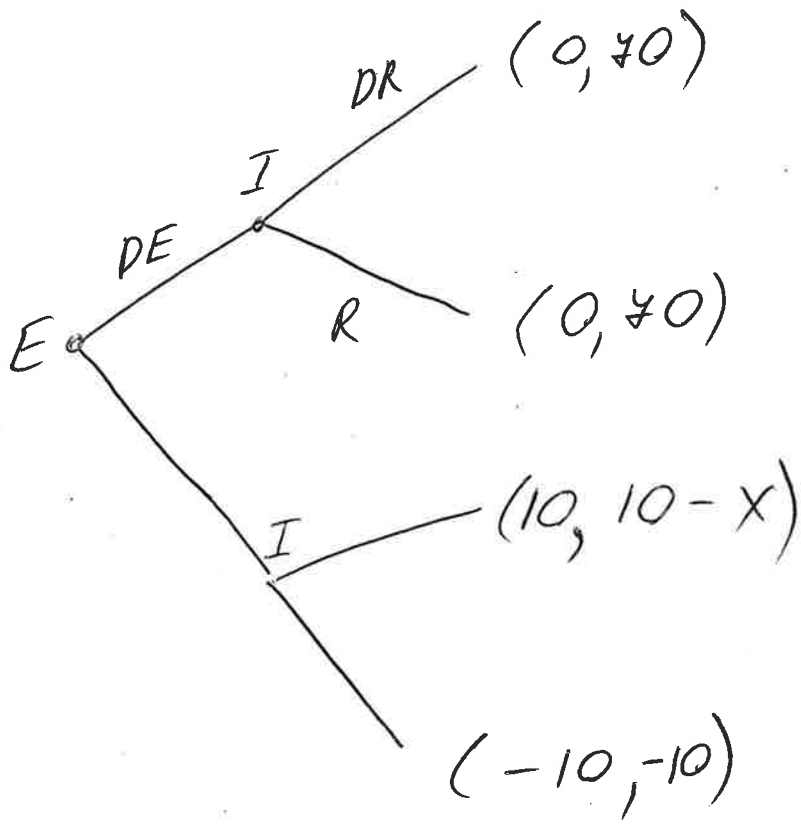


- Payoffs in the figure on the left are written in the form (Entrant, Incumbent)

- I gets 70 if first mover
- I gets 10 if (E, DR) is played.
- So, I would pay $70 - 10 = 60$

(b) 60

(c) (15 points) Assume that the Entrant moves first. What values of x successfully deter entry (i.e. ensure that in the subgame-perfect equilibrium, the Entrant plays DE)?



- E plays DE if I plays R
- I plays R if $-10 > 10 - X$

$$\Rightarrow X > 20$$

(c) $X > 20$