

PRICE DISCRIMINATION

Question 1 – Third-Degree Price Discrimination

There is one movie theater in a town. The town has two groups of people: students and non-students. The non-students have a demand curve:

$$D_1(p_1) = 10 - p_1$$

and the students have a demand curve:

$$D_2(p_2) = 10 - 2p_2$$

The movie theater has a marginal cost of \$2 per customer (cleaning up their spilled soda and popcorn). The fixed cost is 10.

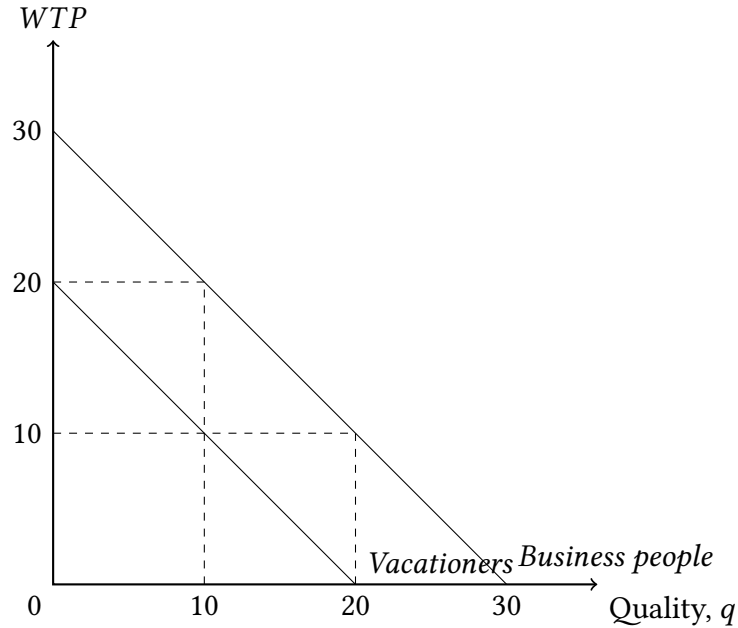
- (i) Suppose first the monopolist movie theater cannot price discriminate. What price should they charge and what quantity will it sell? What profit does it make?
- (ii) Suppose now the monopolist is able to price discriminate. What price should it charge students and what price should it charge non-students? How many tickets will they sell?

Question 2 – Price Discrimination

A monopolist airline faces two types of consumers who value flight quality differently. There is a high willingness-to-pay group (business people) and a low willingness-to-pay group (vacationers). The airline faces zero marginal cost (putting one more person on a plane doesn't any extra).

“Quality” is measured on a 30-point scale, where 30 is extremely luxurious and 0 is extremely uncomfortable.

The two solid downward-sloping lines below measure the willingness-to-pay for a marginal increase in quality for both groups. For any quality level, q , the willingness-to-pay is the area *under the line* between between 0 and q . Each triangle below has an area of 50 and each square has an area of 100. If $q = 10$, vacationers are willing to pay at most 150 for air travel, while business people would pay 250. If the quality level is 0, the area is always 0 so no one would pay for airfare at quality 0.



- (i) If the only people in the world were business people, what should the airline charge for air travel to maximize profits?
- (ii) If the only people in the world were vacationers, what should the airline charge for air travel to maximize profits?

For the rest of the question, assume that 50% of air travelers are business people and 50% are vacationers.

- (iii) Suppose vacationers were able to obtain a “vacationer’s card” which allowed them to get discounts for air travel if discounts were available (like a student card). The airline now has an observable way to tell travelers apart. What should the airline charge each group to maximize profits? What is the average profit made per person?¹
- (iv) Suppose now that a vacationer’s card doesn’t exist so the airline can’t charge different people different prices. If the airline were to choose only one price-quality plan, what would it do to maximize profits? To do this you should check two possibilities:
 - You set a price-quality plan such that both groups would be willing to buy.
 - You set a price-quality plan such that only business people will be willing to buy (but you lose out on half the market).

Find the average profit made per person from both of these possibilities.

- (v) Suppose again that the vacationer’s card doesn’t exist but the airline now wants to set two price-quality plans in order to make the vacationers and business people *self-select* into each plan.

¹If you get revenue x from vacationers and revenue y from business people, the average profit per person is $\frac{x+y}{2}$. If you only sell to business people, the average profit per person is $\frac{y}{2}$.

- What price-quality plans for both groups would make the groups self-select and maximize profits?
- What is the average profit per customer?

Question 3 – Two-Part Tariffs

There is a single theme park in a large state. It can put people on a roller coaster at zero marginal cost (but they do have a fixed cost). The demand for each person for roller coaster rides is given by $D(p) = 200 - \frac{1}{2}p$, where p is the price of each roller coaster ride. What price should the theme park charge for entry into the theme park and how much should it charge for each person to ride the roller coaster?

GAME THEORY

Question 4 – Simultaneous Games

Find all Nash equilibria (pure and mixed) of the following games:

(i)

	<i>L</i>	<i>R</i>
<i>U</i>	2, 4	6, 3
<i>D</i>	3, 1	5, 3

(ii)

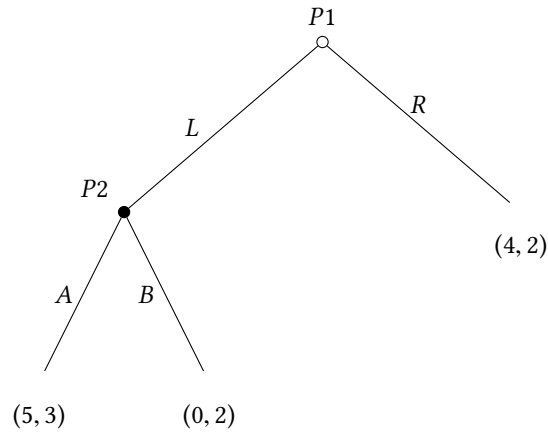
	<i>L</i>	<i>R</i>
<i>U</i>	2, 1	0, 0
<i>D</i>	0, 0	1, 2

(iii)

	<i>L</i>	<i>R</i>
<i>U</i>	-2, -2	4, 0
<i>D</i>	0, 4	2, 2

Question 5 – Sequential Games

Consider the following extensive form game:



- (i) Write the normal form (payoff matrix) of the game.
- (ii) Find all the Nash equilibria of the game.
- (iii) Which of the Nash equilibria that you found are subgame perfect?

OLIGOPOLY

Question 6 – Different Market Structures

The demand curve for a good is given by $D(p) = 5 - \frac{1}{2}p$. The cost function for a firm is given by $c(q) = 2q$.

- (i) The market was served by perfectly competitive firms. What is the market price and total output produced by the industry? What profit does each firm make?
- (ii) The market is served by a monopolist. What price and quantity does the monopolist produce? What profit does it make?
- (iii) The market is served by two firms who compete simultaneously on price. What price does each firm charge? What quantity is produced by both firms? What profit does each firm make?
- (iv) The market is served by two firms who simultaneously choose their quantities. The price is then set to clear the market. What quantity is produced by both firms? What is the price? What is the profit for each firm?
- (v) The market is served by two firms but one firm chooses the quantity to produce first. The other firm then observes this quantity and chooses its own quantity. The price is then set to clear the market. What quantity does each firm produce? What is the price? What profit does each firm make?