Nonlinear pricing example 1: Price Discrimination
Econ 201/Haworth

Assume that a monopoly faces the following demand, marginal revenue and cost curves:

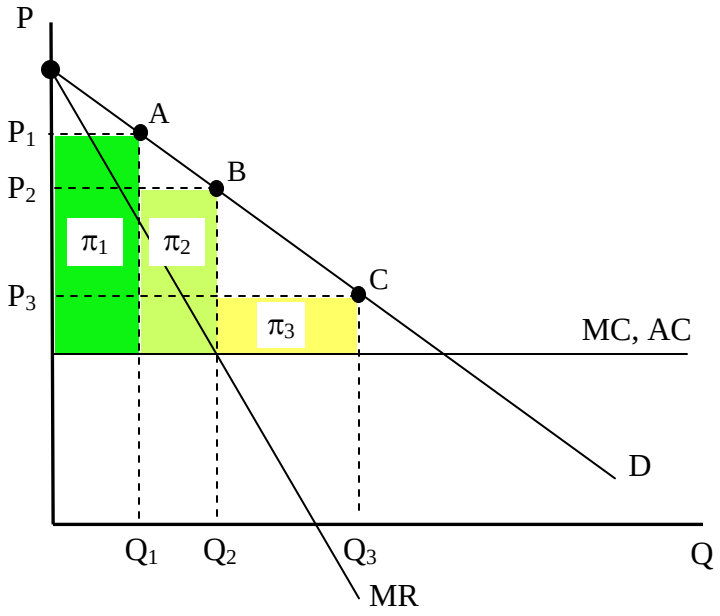
(Demand)	P = 1200 – 4Q	(where P = price, Q = quantity)
(Marginal Revenue)	MR = 1200 – 8Q	
(Marginal Cost)	MC = 400	
(Average Cost)	AC = 400	

Assume further that this firm sells a good that is seasonal (e.g. selling snow shovels in Winter, summer clothes in warm weather, etc) and has enough information to implement price discrimination. She has identified 3 different groups of consumer willing to self-select into buying the good at different points in time, which obviously guarantees that she can prevent resale of this good across the different groups. Here are those 3 groups:

- **(Group 1)** the anxious group: willing to pay more for this good so that they can purchase the good just before the season begins
- **(Group 2)** the average group: more typical consumers who are not willing to pay as much as the anxious group but who would like to purchase the good during the season
- **(Group 3)** the patient group: not willing to pay as much, but also willing to wait until the end of the season to purchase the good (e.g. in order to use it during next year's season)

Let's assume that this monopolist decides upon the following prices for each group:
Group 1: set $P_1 = \$1000$
Group 2: set $P_2 = \$800$
Group 3: set $P_3 = \$500$

The firm would earn profit from this, and here's what everything would look like on a graph:



Question: what would be the profit earned from each group and the overall profit earned from implementing this pricing strategy?

Answer:

Once we view this on a graph, it becomes much easier to calculate profit.

Group 1 is the first to purchase this good. If the price is P_1, then we can use the demand curve to determine how many units will be sold at that price. I.e., if $P = 1200 – 4Q$ and $P_1 = \$1000$, then $Q_1 = 50$. The firm will sell 50 units to Group 1.

Group 2 is the second group to purchase the good. If they face a price of P_2, then we can also use the demand curve to determine the overall number of units sold. I.e., the additional units sold to Group 2 after accounting for the units bought by Group 1. Approaching this as we did above, we determine that $Q_2 = 100$, which means that Group 2 also buys 50 units (i.e. Q_2 = # units bought by Group 1 + # units bought by Group 2).

Group 3 buys last, so with their price of P_3, the demand curve tells us that $Q_3 = 175$, which means that Group 3 purchased an additional 75 units.

The profit for each group is as follows:

$\pi_1 = (P_1 – AC)$(#units bought by Group 1)
$\pi_1 = (\$1000 – \$400)(50)$
$\pi_1 = \$30{,}000$

$\pi_2 = (P_2 – AC)$(#units bought by Group 2)
$\pi_2 = (\$800 – \$400)(50)$
$\pi_2 = \$20{,}000$

$\pi_3 = (P_3 – AC)$(#units bought by Group 3)
$\pi_3 = (\$500 – \$400)(75)$
$\pi_3 = \$7{,}500$

Overall $\pi = \pi_1 + \pi_2 + \pi_3$
Overall $\pi = \$57{,}500$