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1. Assume that there is one movie theatre in town that faces the following distinct demand curves for college students and faculty. The total market demand for movies is comprised only of these two types. Assume the movie theatre has no fixed costs and operates at a MC of $2 per movie ticket.

Quantity	Student's Demand Price	Faculty's Demand Price	Total Market Demand Price
1	10	24	24
2	9	16	16
3	8	12	12
4	7	9.5	10
5	6	4	9.5
6	5	0	9
7	4	0	8
8	3	0	7

a. Given the movie theatre's monopoly power, what would the profit-maximizing price (P_T) be for the movie theatre to charge? What is the associated quantity demanded (Q_T)?

   Set MR (total market)=MC (=2) to determine Q=7. At that quantity the demand schedule relates Q=7 with P=8. Thus, P = $8, QT = 7

b. Assume the movie theatre implements a third-degree price discrimination scheme whereby students and faculty pay different prices.
   i. Given the price determined in part (a), what is the quantity demanded by students (Q_{ST}) who are willing and able to pay for the movie? What is the quantity demanded by faculty (Q_F)? (*Hint: $Q_T = Q_{ST} + Q_F$*)

      Q_{ST} = 3, Q_F = 4

   ii. Given the demand schedule relationship in the table above, what is the maximum price (P_{ST}) the movie theatre can charge to students (Q_{ST})? What is the maximum price that can be charged to faculty (P_F)?

      P_F = 9.50, P_{ST} = 8.00

   iii. Compute the Total Revenue associated with the price discrimination scheme. Does the movie theatre increase or decrease Total Revenue?

> *TR (with PD) = 9.50*4 + 8*3 = 38 + 24 = $62.*
> *TR (no PD) = 8*7 = 56*

   c. Graphically show the impact of impact of price discrimination on consumer surplus and producer surplus.

> ***To illustrate the impact on producer surplus, use the approximated figure below. The area shown by B is transferred to PS from CS under price discrimination.***
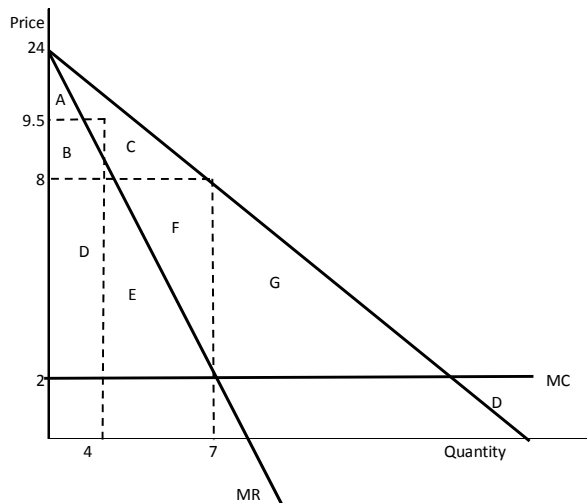
> ***To more closely analyze what happens to consumer surplus, the approximated figure below is used. Initially, CS for faculty are A+B+C+D. Notice that under price discrimination, CS for faculty is reduced by the area C+D. Student CS remains unchanged at B+C.***
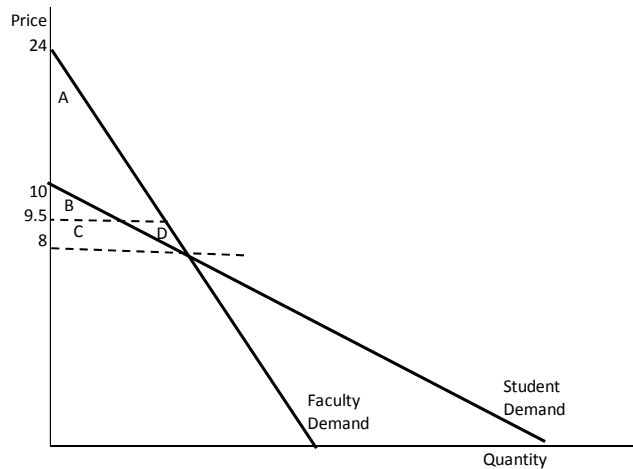
2. Boeing and Airbus are the two main producers of large airplanes that are purchased by major airlines.

   a. What type of market structure would you use to characterize airplane manufacturing (e.g., perfectly competitive, monopolistic competition, oligopoly, monopoly)? Justify your answer.

Probably an oligopoly would be the closest to this market structure there are few firms and barrier to entry are relatively large. Also, strategic activity is an important component of this market, as opposed to branding (as is the case under monopolistic competition).

b. Assume the two firms set quantity and price relative close to a perfectly competitive industry. The two firms propose a horizontal merger to form a monopoly. The two firms cite the lowering marginal cost as a justification for the merger and declare that this will lead to lower prices for consumers. If you are asked to evaluate this merger, what issues will be important in evaluating whether society is better off from this merger. Will consumers be better off? Will the merged company be better off?

Low costs can often lead to increased quantity and higher consumer surplus. However, the addition of monopoly power can also shrink consumer surplus to the extent that price is increased relative to MC. Whether consumers are better off depends on which of these components dominate the other.

c. Assume the merged monopoly also plans to purchase the sole producer of composite materials made exclusively for airplanes. Once again, they cite the ability to lower costs as the main motivation. Explain why or why not their statement is correct given the vertical merger. (*Note: the composite materials manufacturing prices their product as a monopolist prior to the vertical merger*)

Following a vertical merger, the firm prices the input in order to maximize total CS and PS, since they operate on both the consumer and producer side of this market. We know that the sum of CS and PS is maximized under perfect competition, whereas under monopoly power this sum is NOT maximized due to deadweight loss. This movement also leads to a lower input price. Thus, the cost associated with the output market should be lower.

3. Assume a strawberry producer in Washington sells strawberries for a market price of $5 per pound and produces an average of 100 pounds of strawberries per acre. Also, assume the producer must decide how much land to rent in order to produce the profit-maximizing quantity of strawberries. Assume the cost function includes fixed costs (e.g., tractor) and variable costs (e.g., fertilizer, renting land, labor, etc.). The total cost and marginal cost are expressed below.

$$TC = 1{,}000 + 100Q + Q^2$$
$$MC = 100 + 2Q$$

where Q is the amount acres utilized in strawberry production.

a. In order to maximize profits in a perfectly competitive industry, what is the appropriate amount of acres that should be utilized for strawberry production? (*Note: TR = (5*100)*Q while MR = 500*)

Find Q, where MR=MC. 500 = 100 + 2Q -> 400 = 2Q -> Q = 200

b. Now assume that a honey producer moves next door to the area the strawberry producer is renting. As a result, the honey bees often stray into the strawberry fields and yields increase to 120 pounds of strawberries per acre. *Costs do not change but MR does.*

    i. What is the new profit maximizing quantity for the strawberry producer with the higher yields?

        Find Q, where new MR = MC. 5*120 = 100 + 2Q - > 600 = 100 + 2Q -> 500 = 2Q ->
        $\boxed{\textit{Q = 250}}$

    ii. What is the amount of profits that are recognized at this new quantity level, when accounting for the higher yields?

        Profits = TR – TC = 5*120*(250) – (1,000 + 100*(250) + (250)^2) = 150,000 – 88,500
        $\boxed{\textit{= 61,500}}$

    iii. How much higher are these profits relative to before the honey producer moved in?

        Initial profits = 39,000. This means profits have increased by 22,500.

    iv. The honey producer offers to stay next to the strawberry producer as long as the strawberry producer compensates him $500 per year. Is this deal worth it to the strawberry producer?

        Yes. This deal is well-worth it for the strawberry producer since profits gains are greater than $500.

c. Now assume the honey producer expects that each box of bees (B) produces 10 pounds of honey, which can be sold for $7 per pound (*MR = $70 per box*). The marginal cost associated with honey production is computed to be MC = 2B.

    i. Compute the profit-maximizing output for the honey producer given he only produces honey.

        Determine the optimal B where MR=MC or 70=2B. This implies $\boxed{\textit{B}_0\textit{=35}}$

    ii. Assume the honey producer finds that the strawberry producer gains $20 in revenue for each box used by the honey producer. The two producers decide to work out a deal where the honey producer is compensated by the strawberry producer $20 per box that is in honey production. Compute the profit-maximizing output for the honey producer given he collects $20 per box from the strawberry producer.

        Determine the new optimal B where MR=MC or 90=2B. This implies $\boxed{\textit{B}_1\textit{=45}}$

iii. Show how this deal might leads to a socially optimal production level for the honey producer. Also show how in the absence of compensation, the production level of the honey bee producer is sub-optimal.

Before the honey producer is compensated, the private MR (MRP) is taken into account, leading to B=35 and total welfare equal to producer surplus (C) plus the external benefit to the strawberry producer (A). When the honey producer is compensated, MRs is used for production decisions, leading to B=45 and a producer surplus equal to A+B+C plus the addition of D (since payments to the honey producer are equal to A+B+D). Thus, total welfare has increased by B+D when the honey producer is compensated for the positive externality.