Microeconomic Theory: TA Session

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October 24, 2025

Monopoly

In a monopoly, there are many buyers but only one seller, and there are barriers of entry into the market (i.e. firms cannot freely enter or exit)

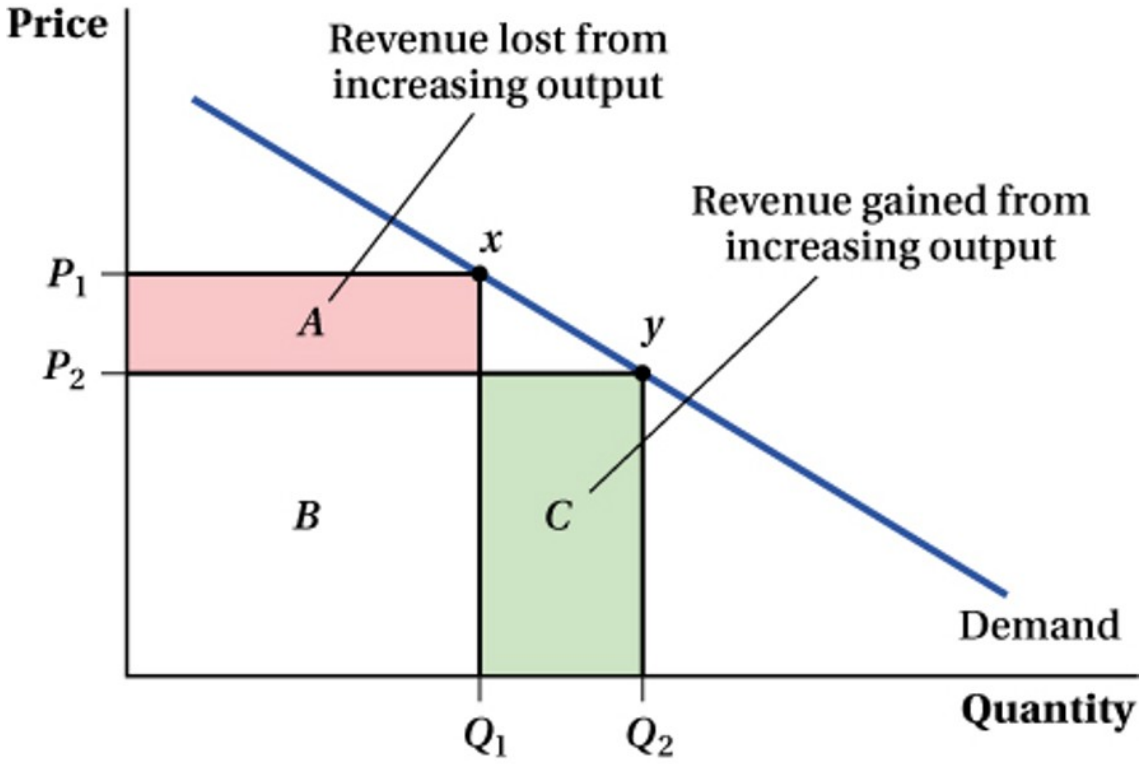
A monopolist is NOT a price taker

- The firm faces a downward sloping demand curve
- Its production decision determines the price

Monopoly: $P > MR$

In a monopoly, $P > MR$

- This is because price falls when the firm increases production

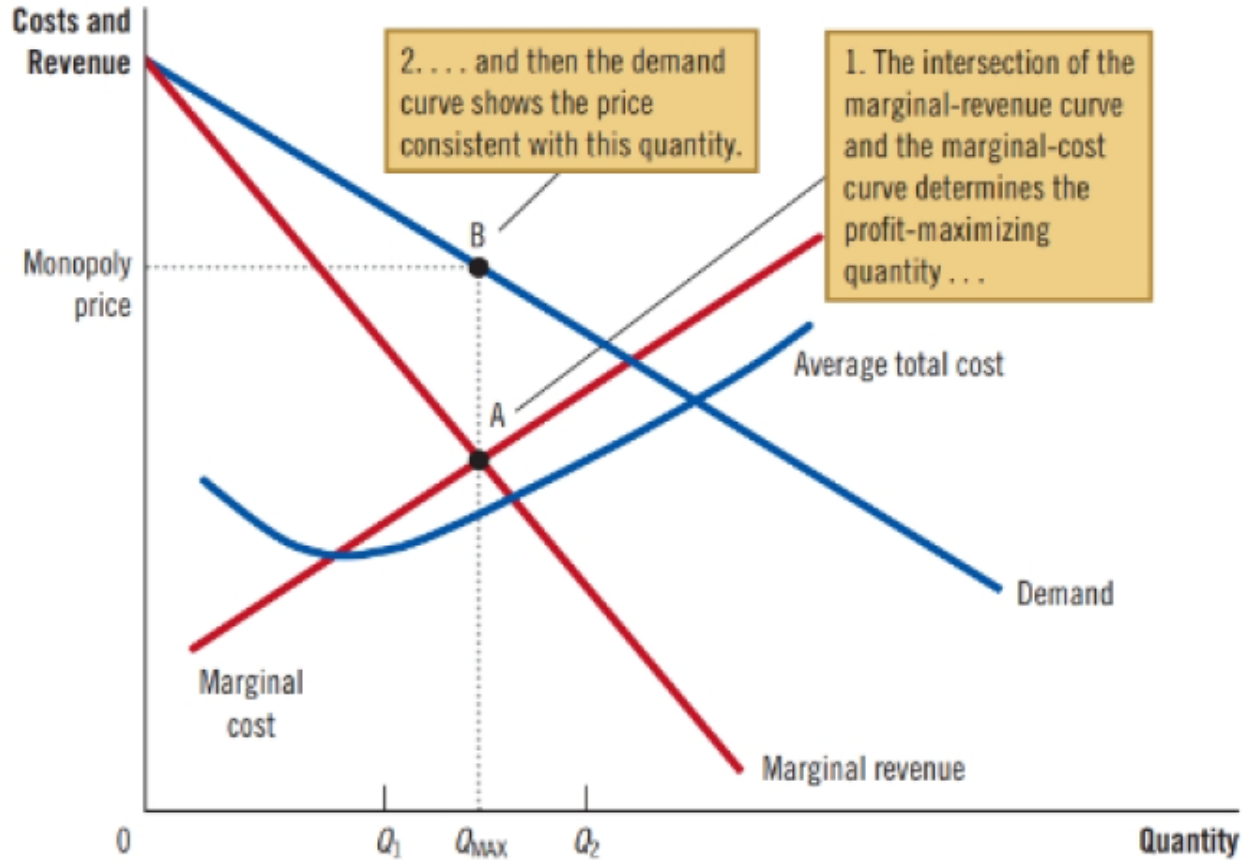


e.g. If demand is $P = 25 - Q$, then revenue is $PQ = 25Q - Q^2$, marginal revenue is $MR = 25 - 2Q$

Profit maximization of a monopolist

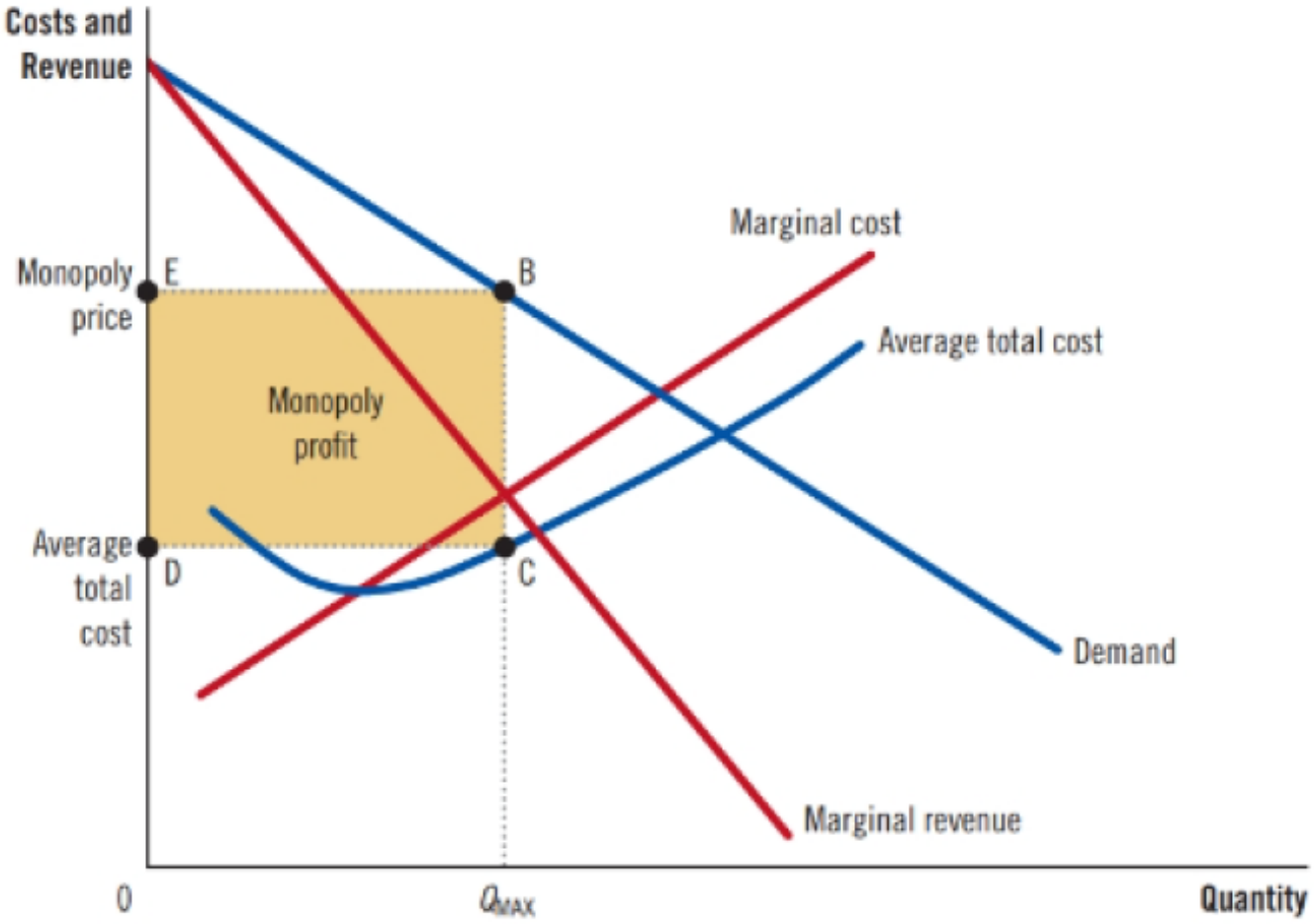
The monopolist will choose to produce where MR=MC

- With $P > MC$, the (percentage) difference between P and MC is called the **markup**



Profit of a monopolist

The monopolist can make a positive profit in the long term



Monopoly - exercise

Suppose Hopkins Cafe runs a monopoly of grilled chicken thighs in the on-campus dining market. The market demand curve for grilled chicken thighs is $P = 24 - Q$, and the total cost curve for Hopkins Cafe is $TC = Q^2 + 64$.

1. Derive Hopkins Cafe's MR curve.
2. Why does the MR curve has the same intercept as the demand curve?
3. Calculate the equilibrium quantity and price, and the profit of the firm.

Monopoly - exercise

Suppose Hopkins Cafe runs a monopoly of grilled chicken thighs in the on-campus dining market. The market demand curve for grilled chicken thighs is $P = 24 - Q$, and the total cost curve for Hopkins Cafe is $TC = Q^2 + 64$.

4. If, instead, this is a perfectly competitive market (with the same cost and market demand curves), what is the price and quantity sold?
5. Calculate the consumer and producer surplus under monopoly and perfect competition.
6. From (5), we see that monopoly is inefficient. What is the deadweight loss from monopoly?

Monopoly - exercise

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7. Pinda, an economist, suggests that the government can increase quantity by providing a subsidy to the monopolist, and that this can maximize societal welfare. Is he right?
8. Calculate the optimal size of the subsidy.
9. Show the consumer surplus, producer surplus, and subsidy in a graph, and calculate their value. Is there a deadweight loss?
10. Many people may object that it is unfair to subsidize a monopolist and allows it to earn even more profit. Does it make any difference if the government subsidizes the consumers instead?

Monopoly exercise - Answers

Answer:

1. $P = 24 - Q$, revenue $= PQ = 24Q - Q^2$, so $MR = 24 - 2Q$.
2. Because, at the intercept, $Q = 0$. When the monopolist increase production, it doesn't need to lower the price for existing production (because there isn't any existing production).
3. $MC = TC' = 2Q$,
   $MR = MC \Rightarrow 24 - 2Q = 2Q \Rightarrow Q = 6, P = 24 - 6 = 18$. The profit of the firm is $PQ - TC = 18 \times 6 - (6^2 + 64) = 8$.
4. In a perfectly competitive market, equilibrium is given by
   $P = MR = 24 - Q$, $MR = MC \Rightarrow 24 - Q = 2Q \Rightarrow Q = 8, P = 16$

Monopoly exercise - Answers

Answer:

5. Under monopoly, consumer surplus is the blue area:
   $CS = (24 - 18) \times 6/2 = 18$. Producer surplus is the purple area:
   $PS = (18 + 6) \times 6/2 = 72$.
   Under perfect competition, consumer surplus is the green area:
   $CS = (24 - 16) \times 8/2 = 32$. Producer surplus is the yellow area:
   $PS = 16 \times 8/2 = 64$

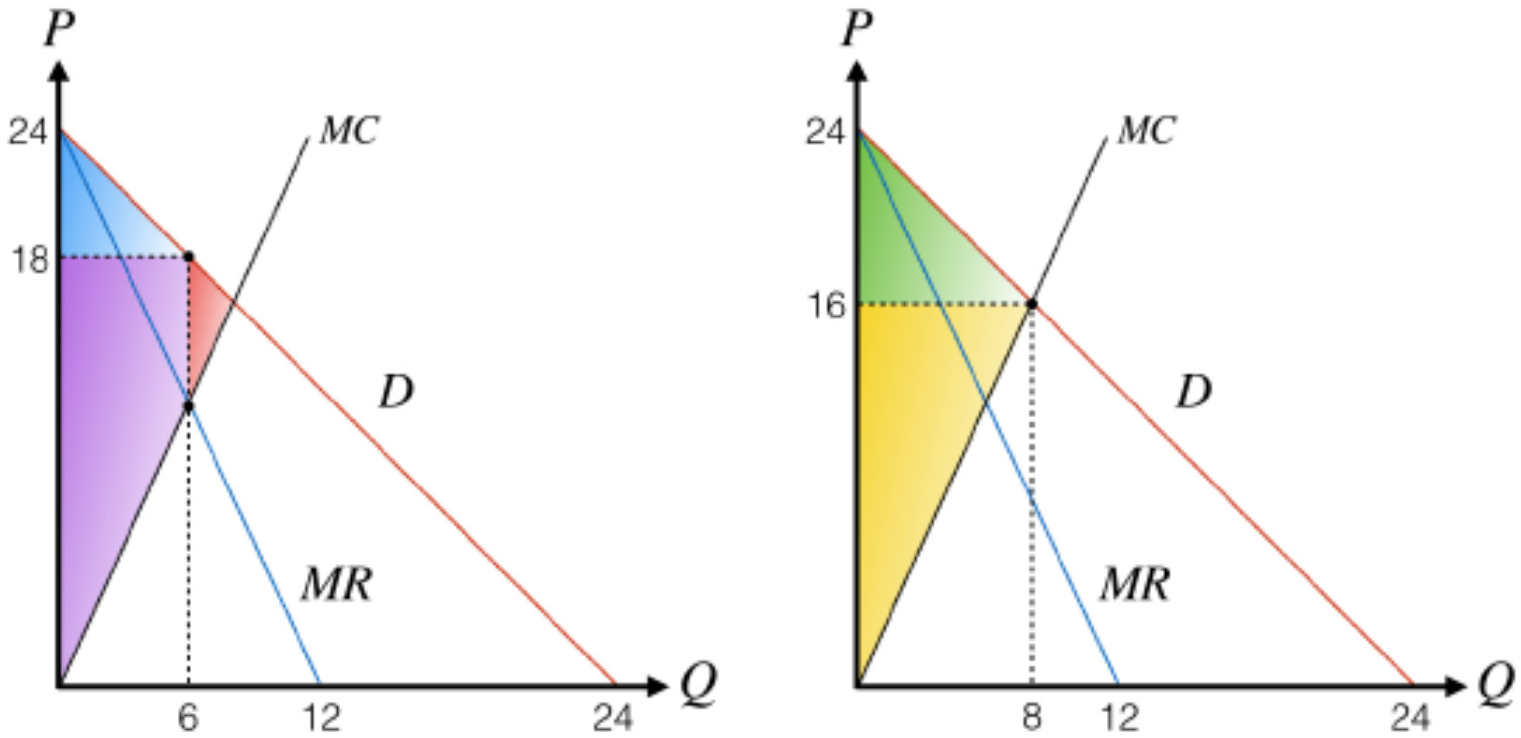


Figure: Left side is monopoly; right side is perf competition

Monopoly exercise - Answers

Answer:

6. We know that perfect competition is efficient. Total surplus under perfect competition is $32 + 64 = 96$. Total surplus under monopoly is $18 + 72 = 90$. The deadweight loss is their difference: $96 - 90 = 6$.
7. He is right. Subsidy can increase equilibrium quantity. If the subsidy raises equilibrium quantity from 6 to the efficient level of 8, then there is no deadweight loss, and societal welfare is maximized.
8. Suppose the subsidy is s per unit. Then, the MC curve becomes $MC = 2Q - s$. For the equilibrium quantity to be 8, we need $MR = MC \Rightarrow 24 - 2 \times 8 = 2 \times 8 - s \Rightarrow s = 8$.

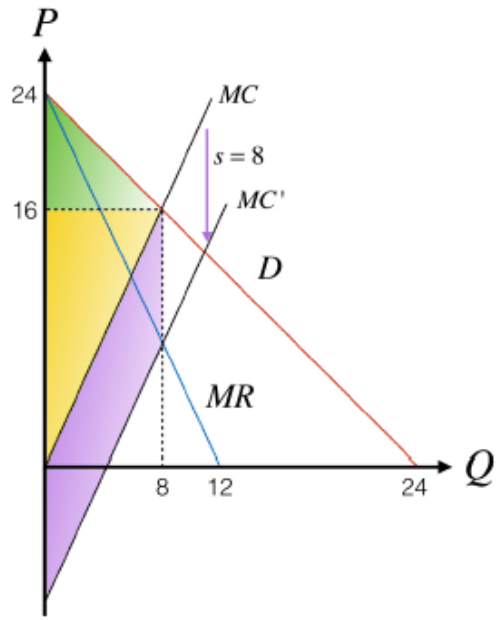
Monopoly exercise - Answers

Answer:

9. Consumer surplus is the green area: $CS = (24 - 16) \times 8/2 = 32$.
   Producer surplus is yellow plus purple: $PS = 64 + 64 = 128$.

   Government subsidy is the purple area: $GS = 64$.

   Total surplus is $CS + PS - GS = 32 + 128 - 64 = 96$. There is no deadweight loss.



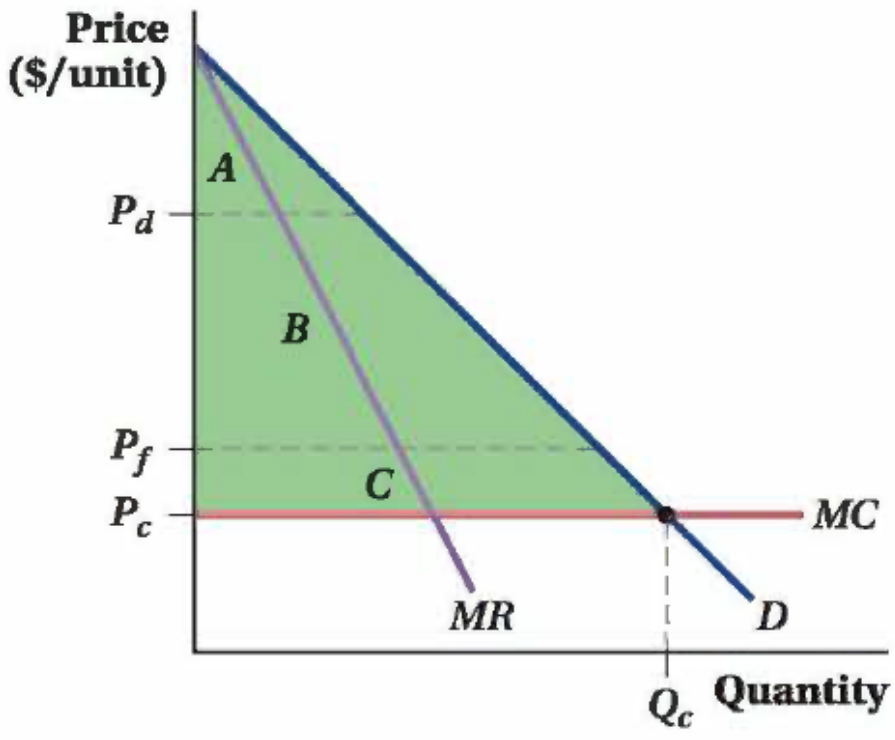
10. It doesn't make any difference. Like taxes, a subsidy to the seller is equivalent to a subsidy to buyers.

First-degree price discrimination

If the firm has complete information about every consumer's willingness to pay, the firm can charge consumers the exact amount of their willingness to pay

- Producer captures all of the surplus; consumer surplus is zero

Consumer surplus	$= 0$
Producer surplus	$= A + B + C$
Deadweight loss from market power	$= 0$



Second-degree price discrimination

If the firm knows there are groups of consumers with different demand curves, but cannot identify which customers have which demand curves, then the firm can offer a variety of price options for consumers to choose

This has to be **incentive compatible**: one group of consumer must not have an incentive to pose as another group to take advantage of the pricing options

- e.g. The firm cannot just offer two price options of \$5 or \$10 per unit — this way everyone will of course choose \$5

A common way to do this is to offer quantity-based discounts

Third-degree price discrimination

If the firm knows there are groups of consumers with different demand curves, and can identify which customers have which demand curves, then the firm can offer different pricing to different groups

- e.g. student discounts

Second-degree price discrimination - exercise

Suppose a firm faces two types of customers. Type A has demand curve $P = 100 - 5Q$; type B has demand curve $P = 50 - 0.5Q$. The firm has constant marginal cost of 20. It cannot directly identify the type of each consumer.

1. Suppose the firm can identify the type of each consumer. Calculate the price that the firm charges each type of consumer, and the quantity that each type of consumer buys.
2. Now suppose the firm cannot identify the type of each consumer. It decides to charge \$60 per unit if the consumer buys < 30 units, and charge \$35 per unit if the consumer buys ≥ 30 units. Is this incentive compatible?

Price discrimination exercise - Answers

Answer:

1. For Type A: $MR = \frac{d(PQ)}{dQ} = 100 - 10Q$. Profit maximization:
   $MR = MC \Rightarrow 100 - 10Q = 20 \Rightarrow Q = 8,\ P = 100 - 5 \times 8 = 60.$
   For Type B: $MR = \frac{d(PQ)}{dQ} = 50 - Q$. Profit maximization:
   $MR = MC \Rightarrow 50 - Q = 20 \Rightarrow Q = 30, P = 50 - 0.5 \times 30 = 35.$
2. The intention of this scheme is to make type A consumers buy 8 units at \$60 each, and type B consumers by 30 units at \$35 each. It suffices to show that each type has no incentive to choose the pricing option meant for the other type.

   Type A's consumer surplus when buying 8 units at \$60 each:
   $(100 - 60) \times 8/2 = 160$. If he chooses Type B's pricing option, he'd buy 30 units at \$35 each, and his consumer surplus is
   $(100 - 35) \times 13/2 - (35 - (-50)) \times 17/2 = -300$, which is worse than buying 8 units at \$60 each. So type A has no incentive to deviate.

   Type B's consumer surplus when buying 30 units at \$35 each:
   $(50 - 35) \times 30/2 = 225$. If he chooses Type A's pricing option, he'd buy zero units (because the price is 60, higher than the intercept of his demand curve), with a consumer surplus of zero. So type B has no incentive to deviate.

   Since both types have no incentive to pose as the other type and choose the other pricing option, this scheme is incentive compatible.