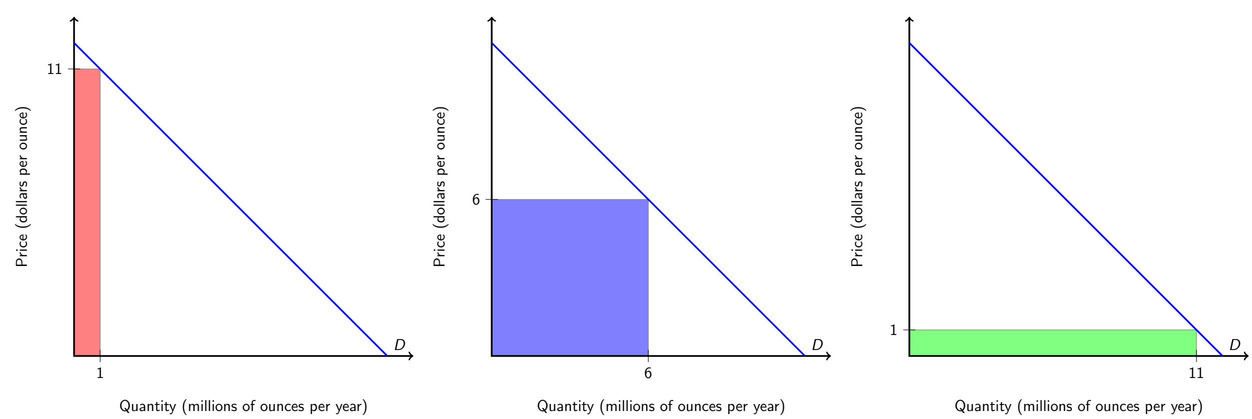
Agenda

1. Profit Maximization by a Monopolist
2. Marginal Revenue
3. Profit Maximization Exercise
4. Effect of Elasticities on Monopoly Price
5. Comparative Statics of Monopoly
6. Monopolist with Multiple Plants and Markets
7. Welfare Effects of Monopoly
8. Monopsony

Profit Maximization by a Monopolist

- Market price depends on quantity produced by monopolist.
- Monopolist faces tradeoff:
  - Low $Q \Rightarrow$
  - High $Q \Rightarrow$
- Must also consider costs.



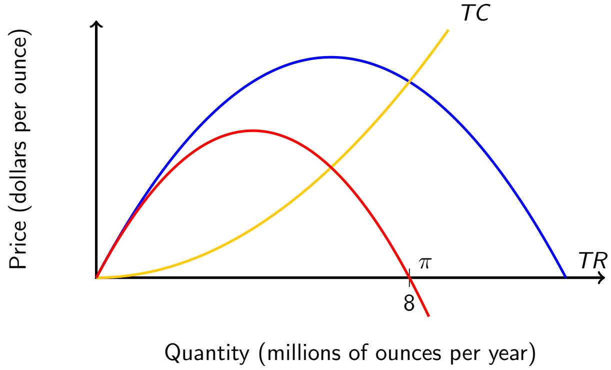
Monopolist's Profit Maximization Conditions

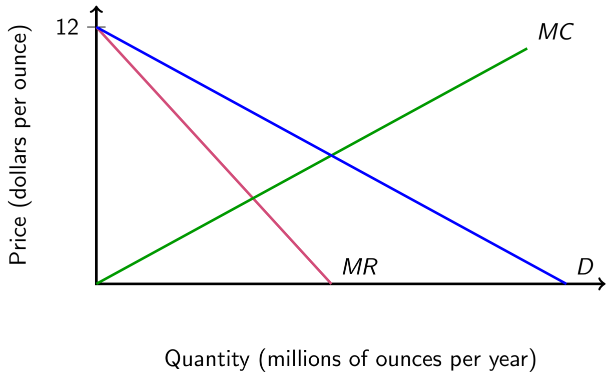
- Example:

Market Demand	$P(Q) = 12 - Q$
Total Revenue	$TR(Q) = Q \times P(Q)$

Total Cost	$TC(Q) = \frac{Q^2}{2}$
Profit	$\pi(Q) = TR(Q) - TC(Q)$

- **Monopolist Profit Maximization Conditions:**





Marginal Revenue for Linear Demand

- If we have a linear demand curve:

$$P(Q) = a - bQ$$

- Then total revenue is:

$$TR(Q) = aQ - bQ^2$$

- Marginal Revenue is:

$$MR(Q) = a - 2bQ$$

- Example #1:

Demand:	$P(Q) = 12 - Q$
Marginal Revenue:	$MR(Q) =$

- Example #2:

Demand:	$P(Q) = 144 - 3Q$
Marginal Revenue:	$MR(Q) =$

- Example #3:

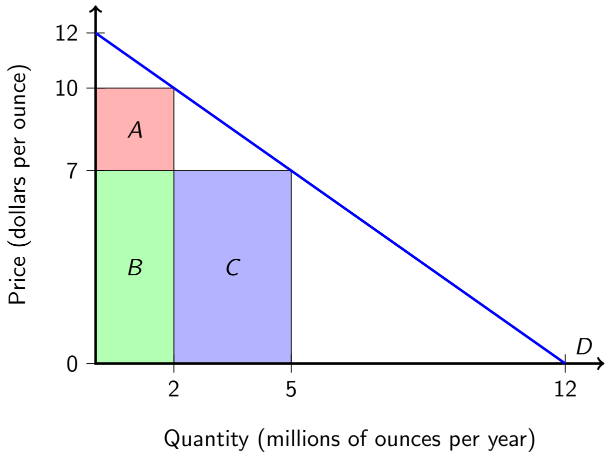
Demand:	$P(Q) = = 25 - 5Q$
Marginal Revenue:	$MR(Q) =$

Breaking Down Marginal Revenue

- What happens when producer changes from production level from $Q = 2$ to $Q = 5$ ($\Delta Q = 3$)?
  - Price changes from $P = 10$ to $P = 7$ ($\Delta P = -3$).
  - Revenue changes from $A + B$ to $B + C$ ($\Delta TR = C - A$).
- Marginal Revenue can be broken down as follows,

$MR \approx$

1. Change in revenue due to
2. Change in revenue due to



- Precisely

$MR(Q) =$

Summarizing Revenue Curves (When $Q > 0$)

- Marginal revenue is ______________ price.

$$MR(Q) = P(Q) + Q\frac{dP}{dQ}$$

- Average Revenue coincides with

____

$$AR(Q) = \frac{TR(Q)}{Q}$$

- Marginal Revenue is ____________ Average Revenue.

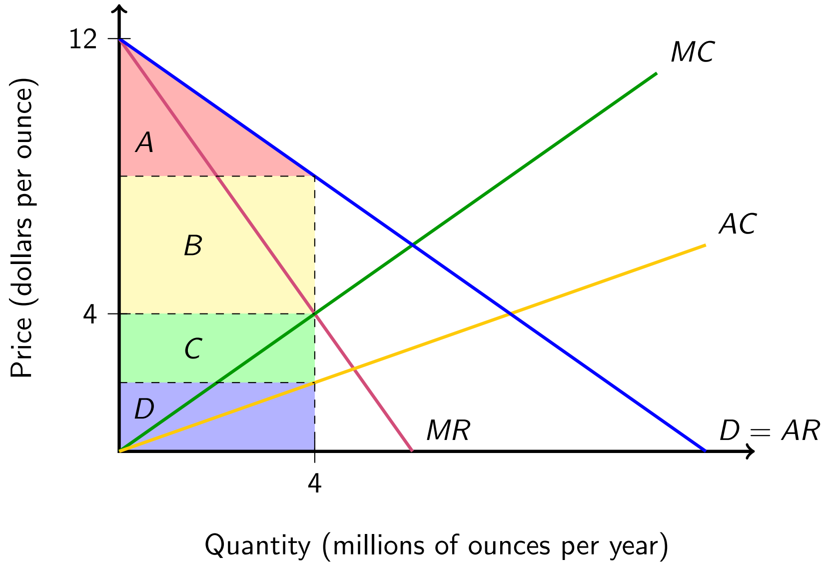
$MR(Q)$ $AR(Q)$

- Marginal Revenue Curve must lie __________ Demand Curve.

Profit Maximization Graphically

- Comments on Profit Maximization

1. Monopolist's price is ________________ marginal cost.
2. Monopolist can have ___________________ economic profits.
3. Consumer surplus is ________________



Exercise

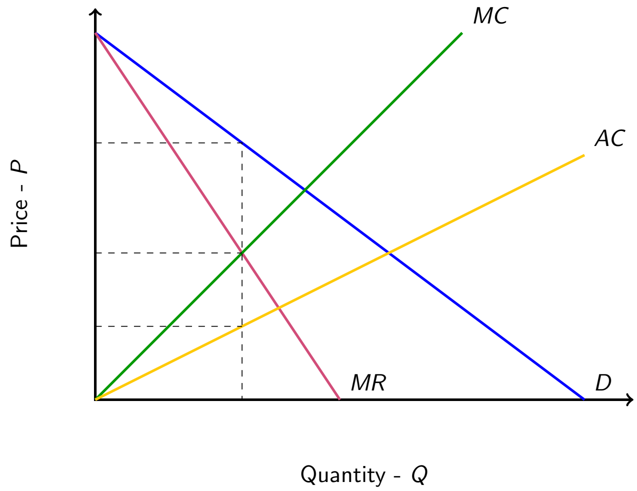
- The demand curve in an industry is,

$$P(Q) = 30 - 3Q$$

- A monopolist has total cost $TC(Q) = 2Q^2$.
- **Your Task:**

1. What is the equation for total revenue and marginal revenue?
2. What is the equation for average cost and marginal cost?
3. Find the profit maximizing quantity and price for the monopolist.
4. What are the monopolist's profits?
5. What is the Consumer Surplus?

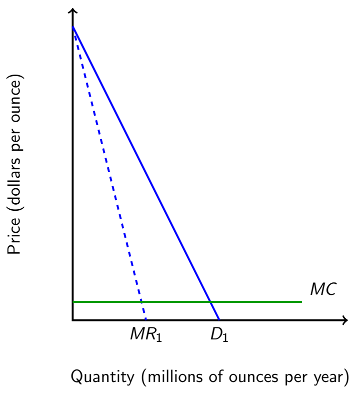
Solution



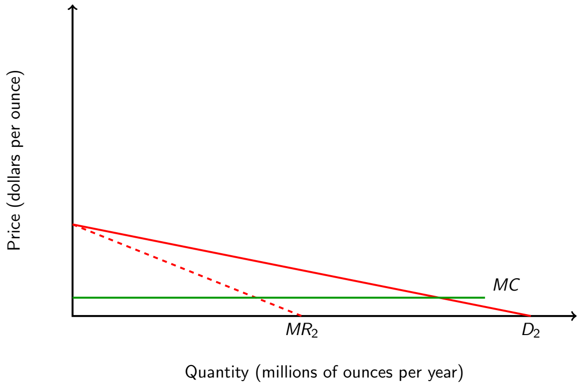
- TR and MR
- AC and MC
- Profit max P and Q
- Profits
- Consumer surplus

Effect of Elasticities on Monopoly Price

- Monopolist pricing decision depends on industry demand curve.
- If demand is inelastic, monopolist has ____________ to raise price.



- If demand is elastic, monopolist has ____________ to raise price.



- Relationship to substitutes.

Inverse Elasticity Pricing Rule

- Marginal Revenue,

$$MR = P + Q\frac{dP}{dQ} =$$

- Profit Maximizing Condition,

$$MC(Q) = MR(Q) =$$

- **Inverse elasticiy pricing rule:**,

- If demand is ________________________________ then P^* is close to MC^*.
- If demand is _______________________________ then P^* is not close to MC^*.

Applying IEPR

- **Example 1:** $Q = 5P^{-3}$ and $MC(Q) = 20$.
  - Elasticity:

- **Example 2:** $Q = 5P^{-300}$ and $MC(Q) = 20$.
  - Elasticity:

- ____________________ gives monopolist less freedom to raise price.

Market Power

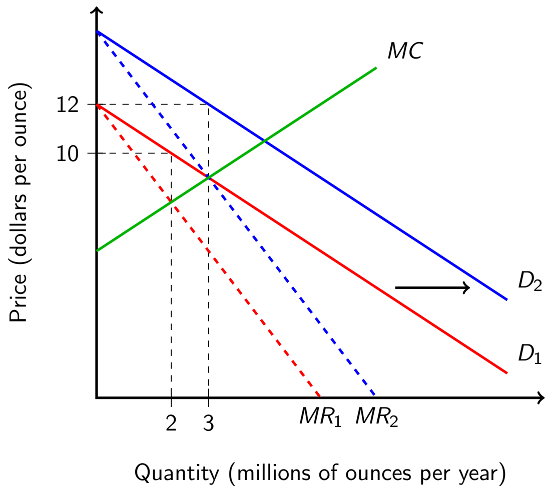
- IEPR applies not only to monopolists.
- **Market Power:** The power of an individual economic agent to affect the price that prevails in the market.
- **Lerner Index of Market Power (LIMP):** Percentage markup of price over marginal cost,

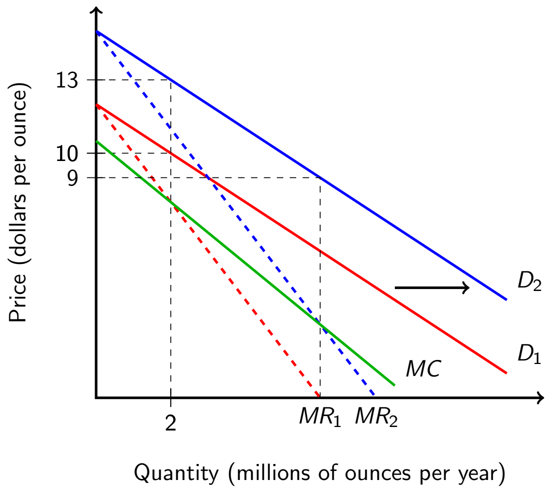
$$0 \leq \frac{P - MC}{P} \leq 1$$

  - LIMP is ______ in perfectly competitive market.
  - LIMP is _________ in any industry that is not perfectly competitive.
  - Higher LIMP means _______ market power.
    - Coke Lerner Index
    - Pepsi Lerner Index

Shift in Market Demand

- Effect of increase in demand in all markets:

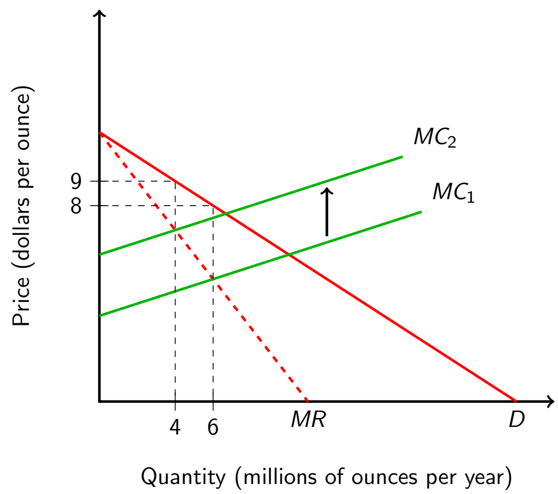




- Quantity produced by monopolist will ___________________________.
- Monopolists selling price will ____________________________.

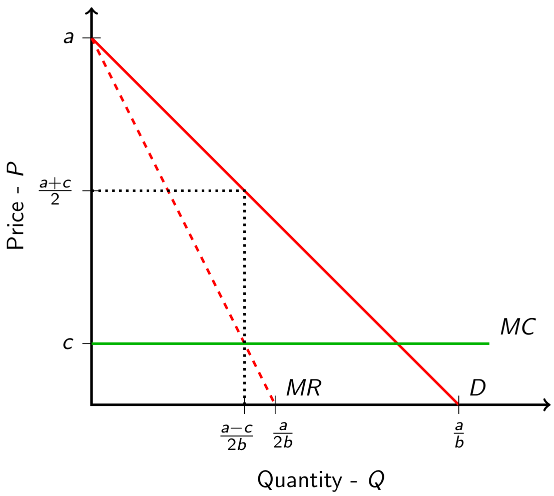
Shift in Marginal Cost

- Effect of increase in marginal cost:



- After MC increases, if $MR(Q_1) = MC_1(Q_1)$, then ______________________
- Quantity produced by monopolist will ________________________.
- Monopolists selling price will ________________________.

Monopolist Midpoint Rule



- Midpoint rule works when:
  1. Linear Demand: $P(Q) = a - bQ$
  2. Constant Marginal Cost: $MC(Q) = c$
- Midpoint Rule:
  - Price is halfway between a and c:
  - Quantity halfway between 0 and MC=MR:
- Implications:
  - If a increases, then ______________________
  - If b increases, then ________________________________

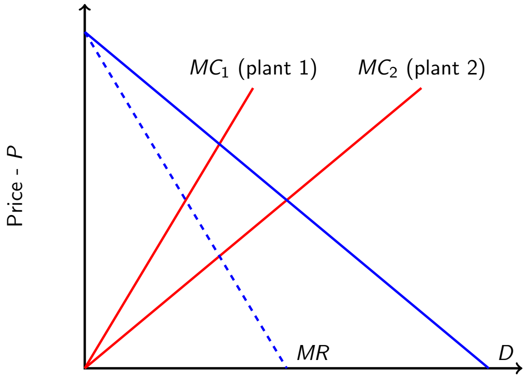
Monopolist With Multiple Plants

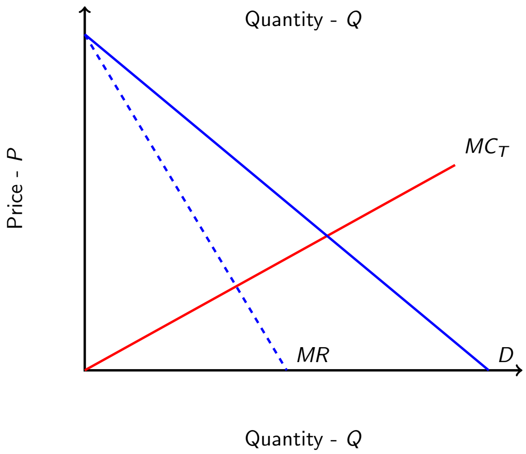
- Firm has two plants, with different marginal costs.

- Wants to produce 6 units.

- What is profit maximizing quantity?
  - **Multiplant Marginal Cost Curve (MC_T):** ________________ sum of marginal cost curves of individual plants.

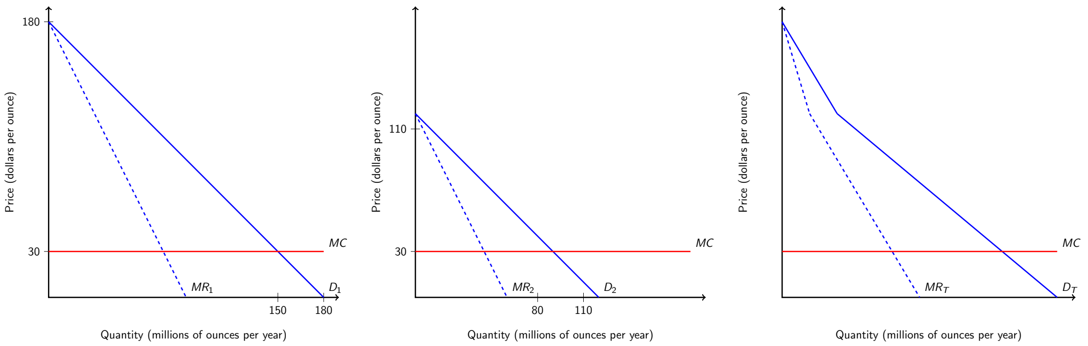
- **Cartel:** A group of producers that collusively determines the price and output in a market.





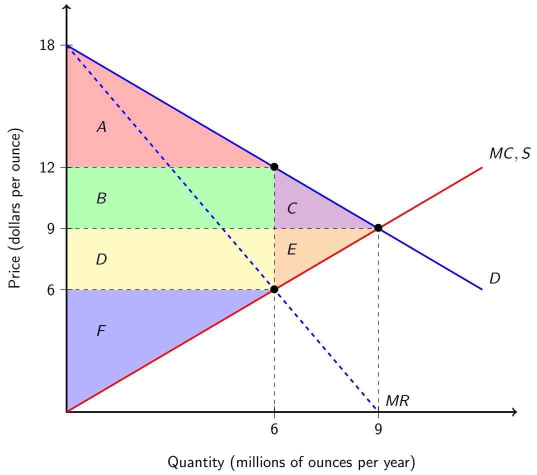
Monopolist with Multiple Markets

- Monopolist has two different markets, but can only charge one price.
  - Since monopolist can't differentiate, total demand is horizontal sum of market demands D_T



	Market 1	Market 2	Total Market
Q^*			
P^*			
π			

Welfare Effects of Monopoly



	Perfect Competition	Monopoly	Impact
Consumer Surplus			
Producer Surplus			
Net Benefit			
Deadweight Loss			

Why Do Monopolies Exist?

- **Natural Monopolies:** Market where at any level of production Q, it is cheaper for one firm to produce Q than two or more firms to produce Q.
  - Electricity, Cable TV, Cell Phone.
  - Must have economies of scale.
  - Also depends on size of market demand.
- **Barriers to entry:** Factors that allow an incumbent firm to earn positive economic profits while making it unprofitable for newcomers to enter the industry.
  - Structural: Exist because of market structure.
  - Strategic: Strategies developed by firms.
  - Legal: Patents (Xerox and Polaroid)

Monopsony

- **Monopsony Market** - Market with single buyer and many sellers.
- Example - Coal Mining Company in a small town:
  - Many sellers (workers sell of labor), and one buyer (the mining company).
  - If the company hires more workers,
    - The additional worker will lead to more output.
    - The additional worker will cause all workers to receive higher wage.
- Monopolist limits supply to keep prices high.
- Monopsonist limits demand to keep prices low.
- Both lead to inefficiency (positive DWL).