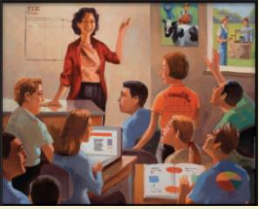


Elasticity and Its Application

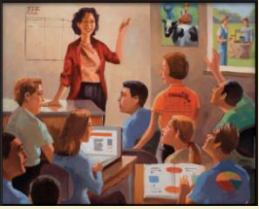




The Elasticity of Demand

- **Elasticity**
 - Measure of the responsiveness of quantity demanded or quantity supplied
 - To a change in one of its determinants
- **Price elasticity of demand**
 - How much the quantity demanded of a good
 - Responds to a change in the price of that good

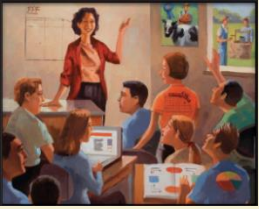




The Elasticity of Demand

- **Price elasticity of demand**
 - Percentage change in quantity demanded divided by the percentage change in price
- **Elastic demand**
 - Quantity demanded responds substantially to changes in price
- **Inelastic demand**
 - Quantity demanded responds only slightly to changes in price





The Elasticity of Demand

- **Determinants of price elasticity of demand**
 - Availability of close substitutes
 - Goods with close substitutes – more elastic demand
 - Necessities vs. luxuries
 - Necessities – inelastic demand
 - Luxuries – elastic demand

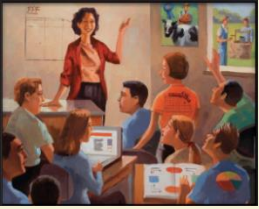




The Elasticity of Demand

- **Determinants of price elasticity of demand**
 - Definition of the market
 - Narrowly defined markets – more elastic demand
 - Time horizon
 - Demand is more elastic over longer time horizons



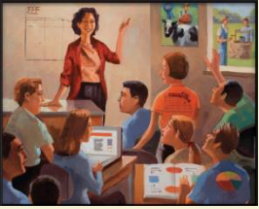


The Elasticity of Demand

- **Computing the price elasticity of demand**
 - Percentage change in quantity demanded divided by percentage change in price
 - Use absolute value (drop the minus sign)
- **Midpoint method**
 - Two points: (Q_1, P_1) and (Q_2, P_2)

$$\text{Price elasticity of demand} = \frac{(Q_2 - Q_1) / [(Q_2 + Q_1) / 2]}{(P_2 - P_1) / [(P_2 + P_1) / 2]}$$





The Elasticity of Demand

- **Variety of demand curves**
 - Demand is elastic
 - Price elasticity of demand > 1
 - Demand is inelastic
 - Price elasticity of demand < 1
 - Demand has unit elasticity
 - Price elasticity of demand $= 1$





The Elasticity of Demand

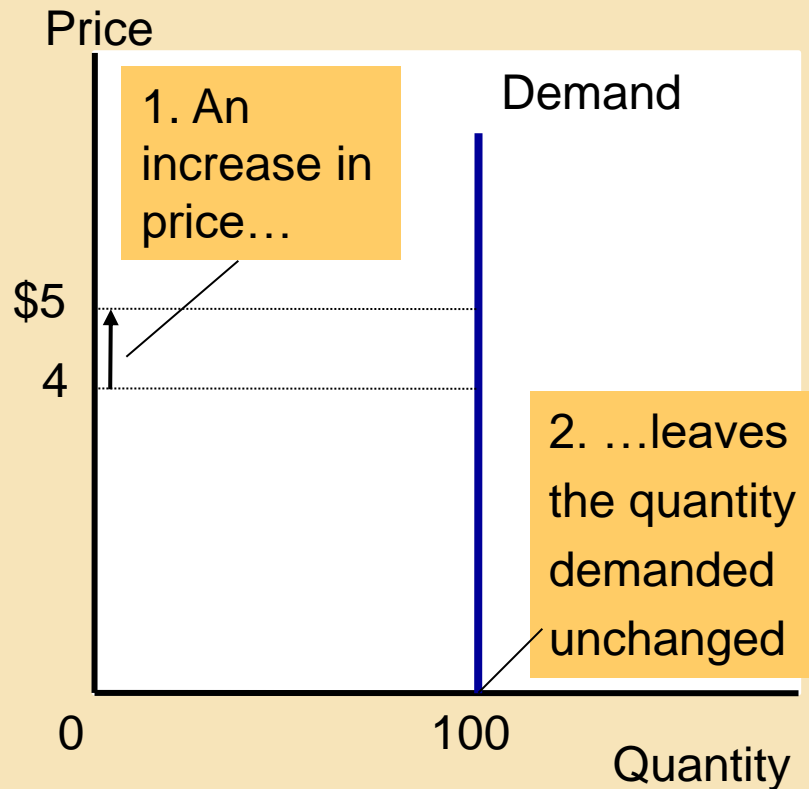
- **Variety of demand curves**
 - Demand is perfectly inelastic
 - Price elasticity of demand = 0
 - Demand curve is vertical
 - Demand is perfectly elastic
 - Price elasticity of demand = infinity
 - Demand curve is horizontal
- **The flatter the demand curve**
 - The greater the price elasticity of demand
 - But elasticity is NOT just the slope, but also the position on the curve



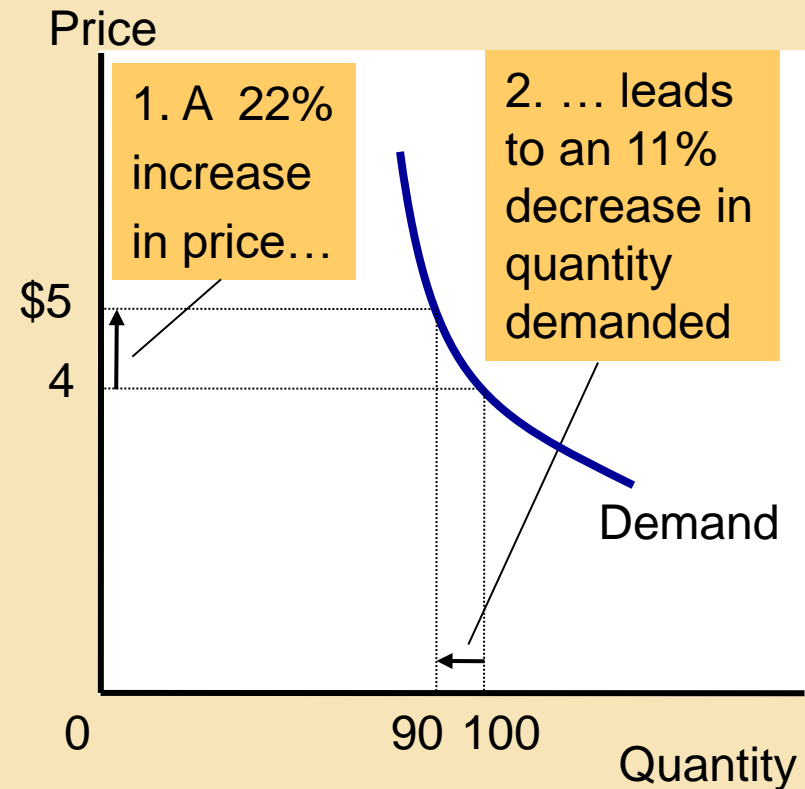
Figure 1

The Price Elasticity of Demand (a, b)

(a) Perfectly Inelastic Demand:
Elasticity Equals 0



(b) Inelastic Demand: Elasticity Is
Less Than 1

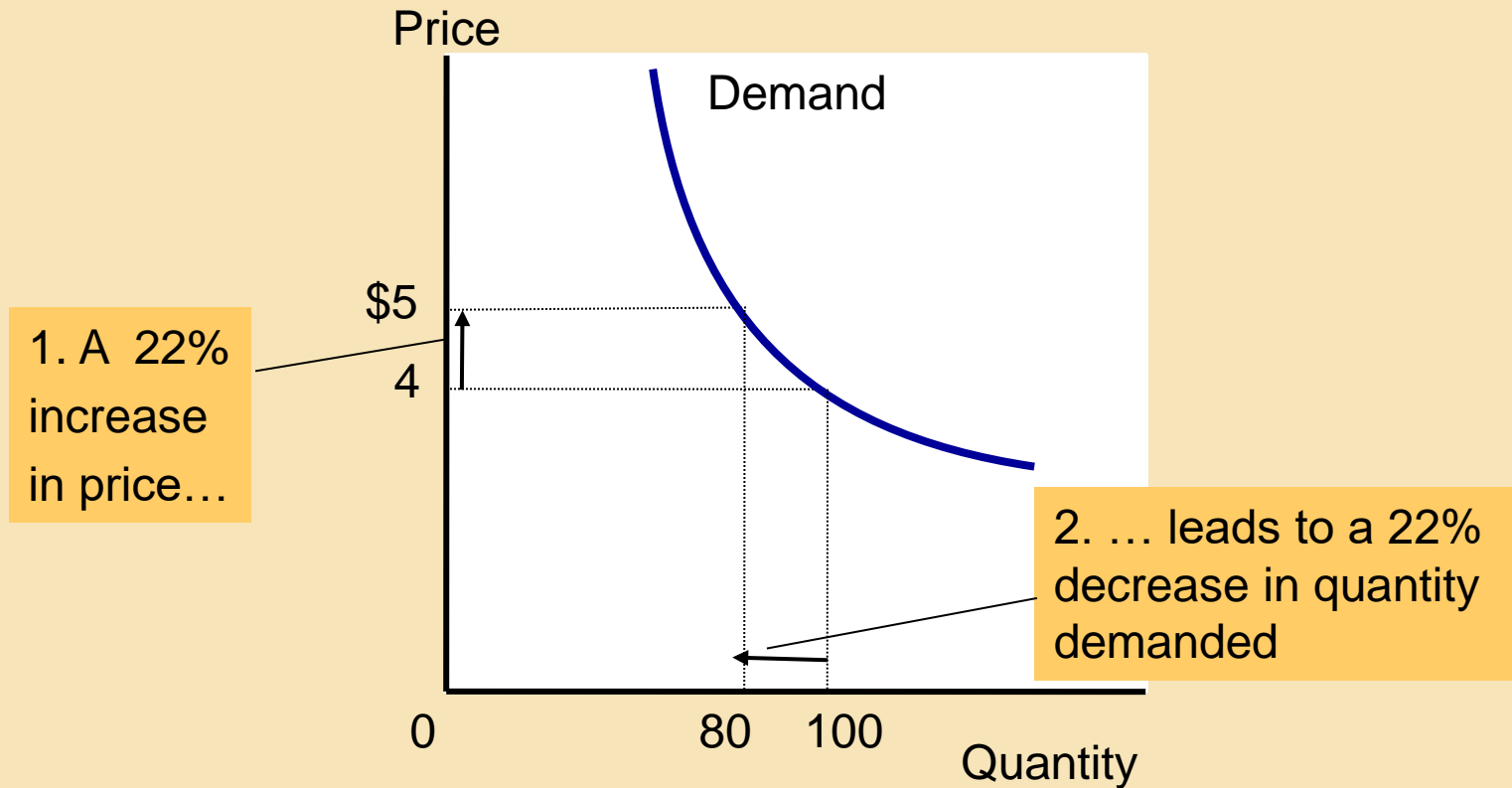


The price elasticity of demand determines whether the demand curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.

Figure 1

The Price Elasticity of Demand (c)

(c) Unit Elastic Demand: Elasticity Equals 1

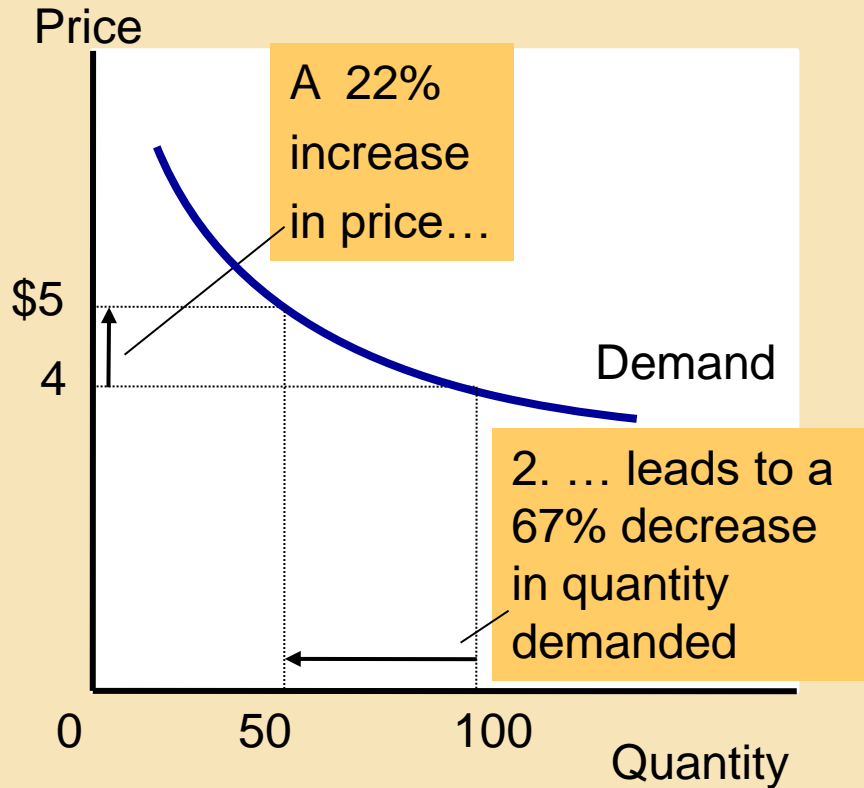


The price elasticity of demand determines whether the demand curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.

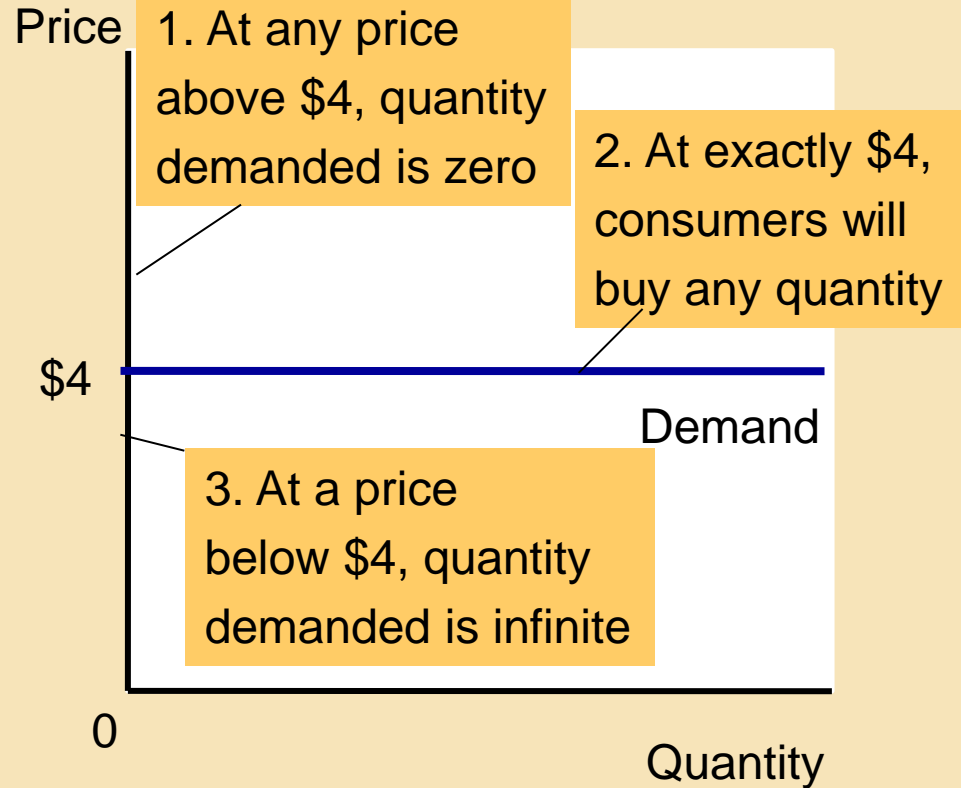
Figure 1

The Price Elasticity of Demand (d, e)

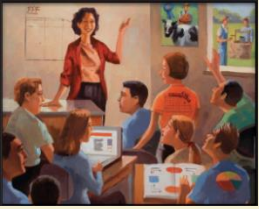
(d) Elastic demand:
Elasticity > 1



(e) Perfectly elastic demand:
Elasticity equals infinity



The price elasticity of demand determines whether the demand curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.

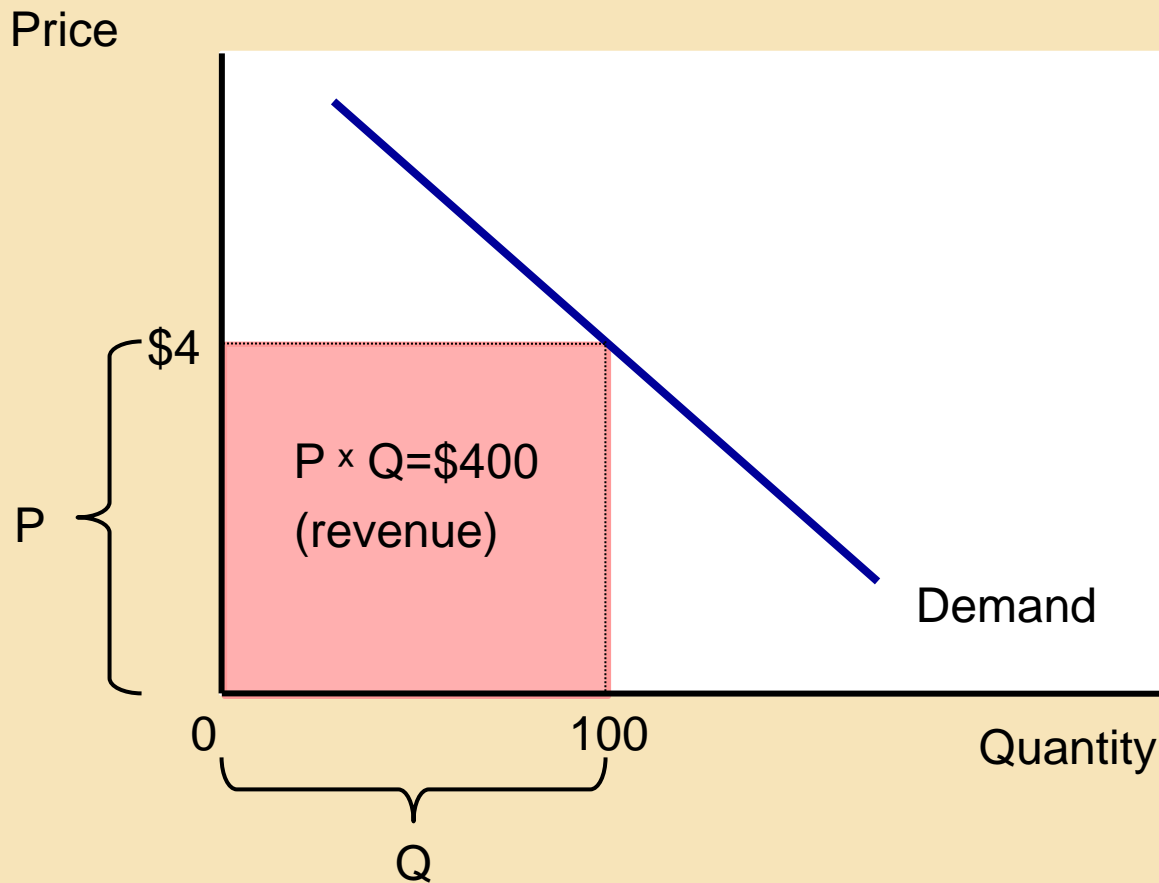


Demand Elasticity and Revenue

- **Total revenue, TR**
 - Amount paid by buyers and received by sellers of a good
 - Price of the good times the quantity sold ($P \times Q$)
- **For a price increase**
 - If demand is inelastic, TR increases
 - If demand is elastic, TR decreases

Figure 2

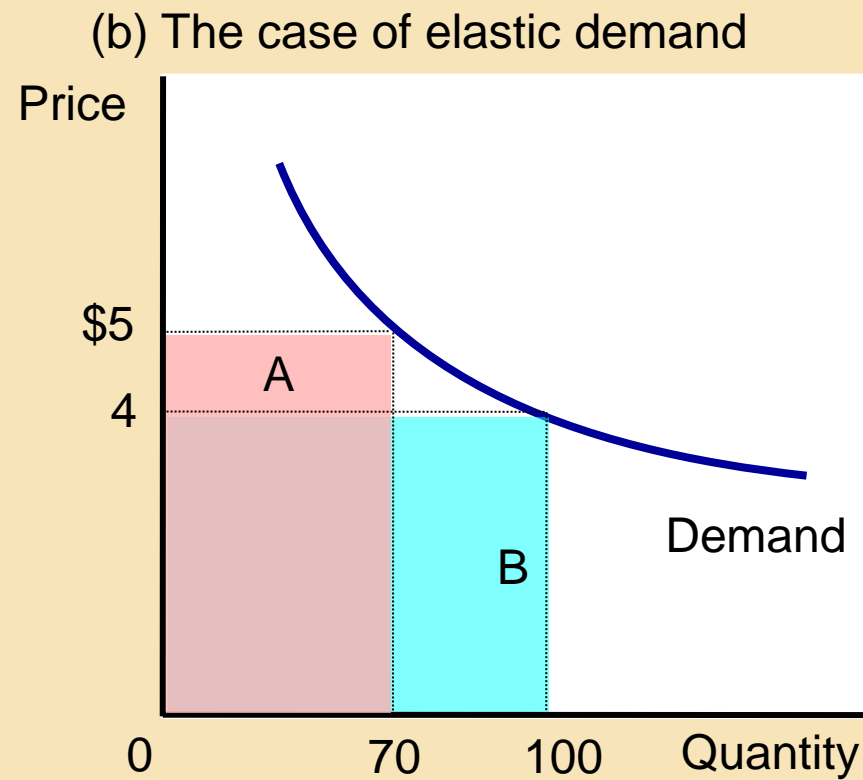
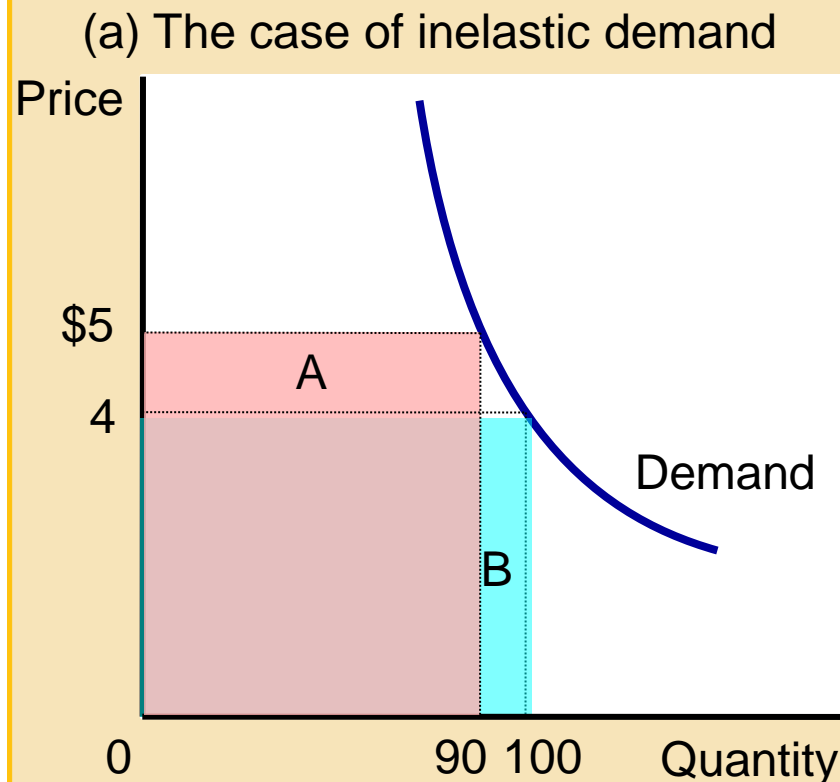
Total Revenue



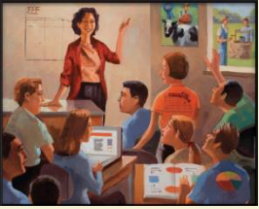
The total amount paid by buyers, and received as revenue by sellers, equals the area of the box under the demand curve, $P \times Q$. Here, at a price of \$4, the quantity demanded is 100, and total revenue is \$400.

Figure 3

How Total Revenue Changes When Price Changes



The impact of a price change on total revenue (the product of price and quantity) depends on the elasticity of demand. In panel (a), the demand curve is inelastic. In this case, an increase in the price leads to a decrease in quantity demanded that is proportionately smaller, so total revenue increases. Here an increase in the price from \$4 to \$5 causes the quantity demanded to fall from 100 to 90. Total revenue rises from \$400 to \$450. In panel (b), the demand curve is elastic. In this case, an increase in the price leads to a decrease in quantity demanded that is proportionately larger, so total revenue decreases. Here an increase in the price from \$4 to \$5 causes the quantity demanded to fall from 100 to 70. Total revenue falls from \$400 to \$350.



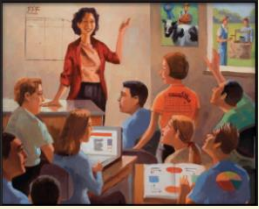
Income Elasticity of Demand

- **Income elasticity of demand**
 - How much the quantity demanded of a good responds to a change in consumers' income
 - Percentage change in quantity demanded
 - Divided by the percentage change in income



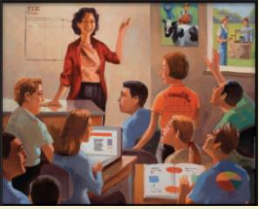
Income Elasticity of Demand

- **Normal goods**
 - Positive income elasticity
 - Necessities
 - Smaller income elasticities
 - Luxuries
 - Large income elasticities
- **Inferior goods**
 - Negative income elasticities



Cross-Price Elasticity of Demand

- Cross-price elasticity of demand
 - How much the quantity demanded of one good responds to a change in the price of another good
 - Percentage change in quantity demanded of the first good
 - Divided by the percentage change in price of the second good



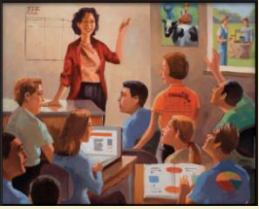
The Elasticity of Demand

- **Substitutes**

- Goods typically used in place of one another
- Positive cross-price elasticity

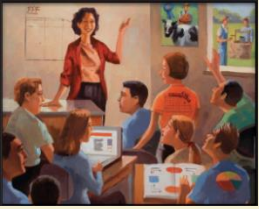
- **Complements**

- Goods that are typically used together
- Negative cross-price elasticity



The Elasticity of Supply

- Price elasticity of supply
 - How much the quantity supplied of a good responds to a change in the price of that good
 - Percentage change in quantity supplied
 - Divided by the percentage change in price
 - Depends on the flexibility of sellers to change the amount of the good they produce



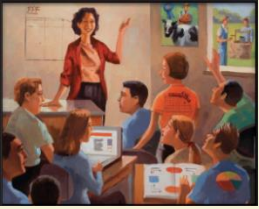
Applications: Economics is everywhere

- Now you should be able to understand...
 - Why some people pay more than others for the same flight on a plane
 - Why restaurants give senior discounts
 - Why some businesses give out coupons to customers
 - Why some gas stations charge higher prices than others
 - Why no two students pay the same amount for the same degree
 - *Who pays a higher price?*



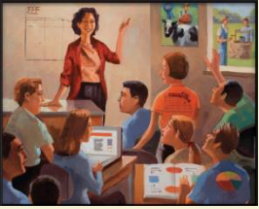
Applications: Economics is Everywhere

- How would Omaha Steaks perform during a recession as compared to McDonald's?
- Why did the “second Texas oil boom” begin in 2008 (not 650 million years ago)?



The Elasticity of Supply

- **Elastic supply**
 - Quantity supplied responds substantially to changes in the price
- **Inelastic supply**
 - Quantity supplied responds only slightly to changes in the price
- **Determinant of price elasticity of supply**
 - Time period
 - Supply is more elastic in long run



The Elasticity of Supply

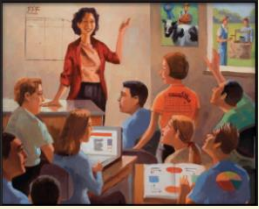
- **Computing price elasticity of supply**
 - Percentage change in quantity supplied divided by percentage change in price
 - Always positive
- **Midpoint method**
 - Two points: (Q_1, P_1) and (Q_2, P_2)

$$\text{Price elasticity of supply} = \frac{(Q_2 - Q_1) / [(Q_2 + Q_1) / 2]}{(P_2 - P_1) / [(P_2 + P_1) / 2]}$$



The Elasticity of Supply

- Variety of supply curves
 - Supply is unit elastic
 - Price elasticity of supply = 1
 - Supply is elastic
 - Price elasticity of supply > 1
 - Supply is inelastic
 - Price elasticity of supply < 1

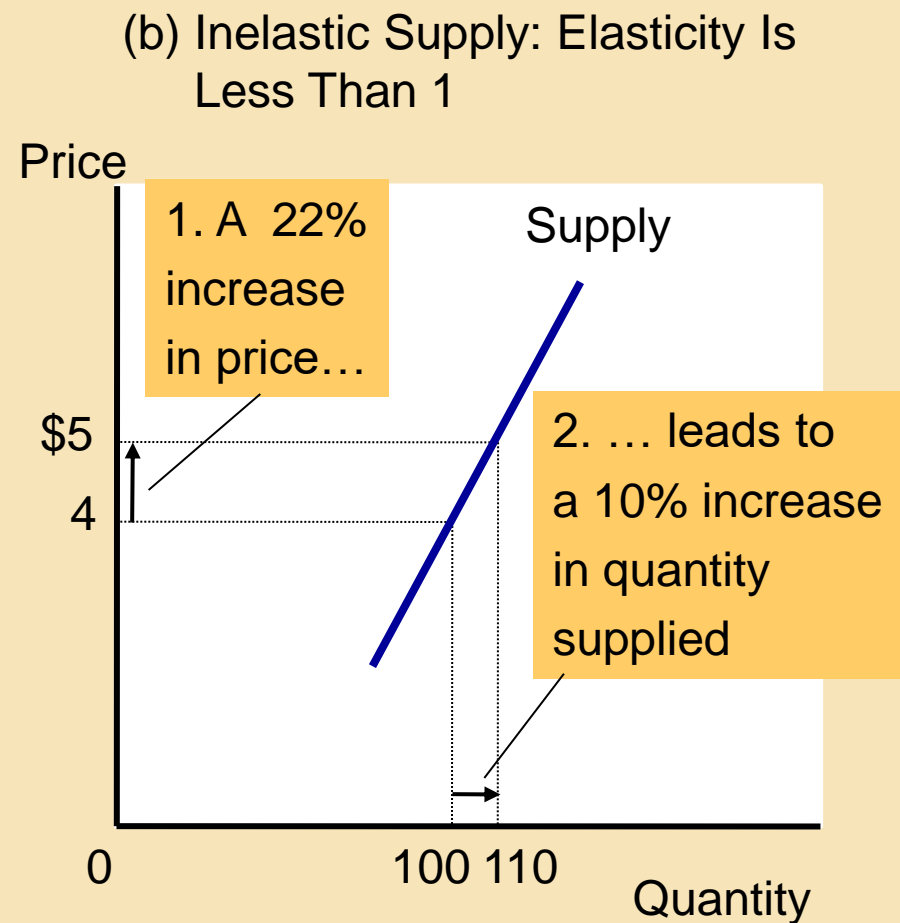
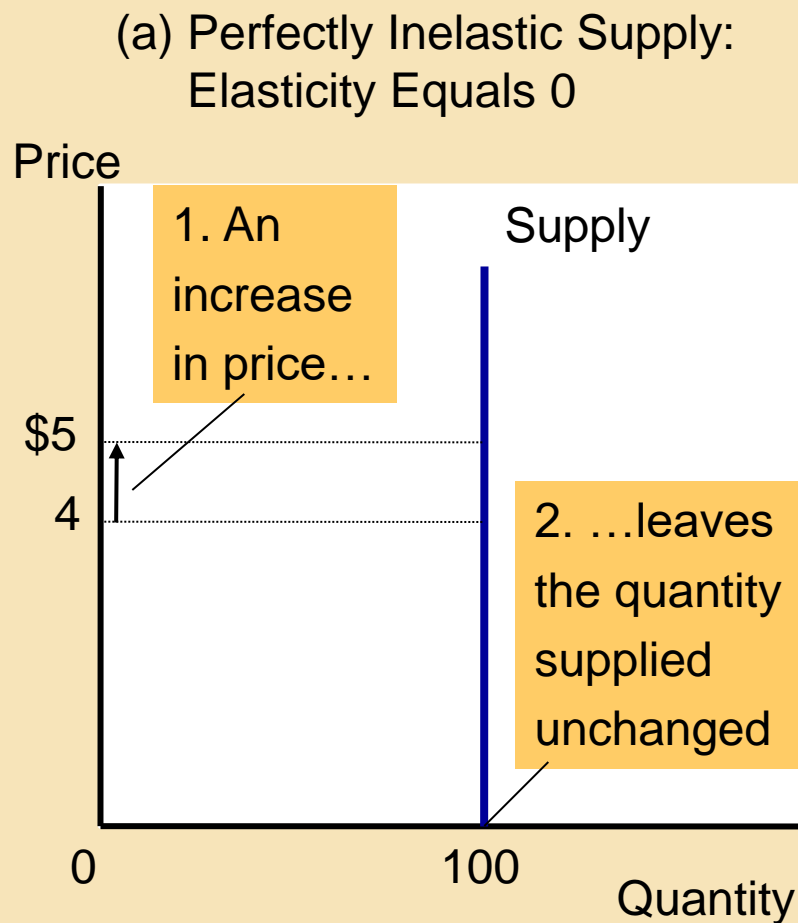


The Elasticity of Supply

- **Variety of supply curves**
 - Supply is perfectly inelastic
 - Price elasticity of supply = 0
 - Supply curve – vertical
 - Supply is perfectly elastic
 - Price elasticity of supply = infinity
 - Supply curve – horizontal

Figure 5

The Price Elasticity of Supply (a, b)

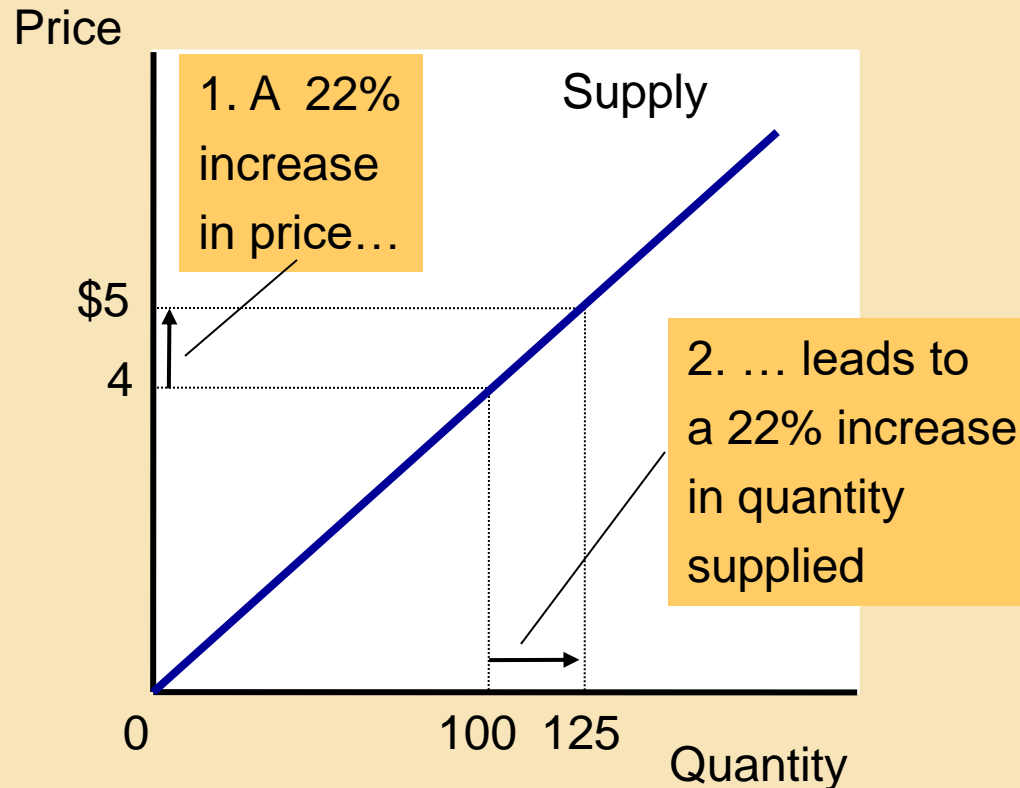


The price elasticity of supply determines whether the supply curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.

Figure 5

The Price Elasticity of Supply (c)

(c) Unit Elastic Supply: Elasticity Equals 1

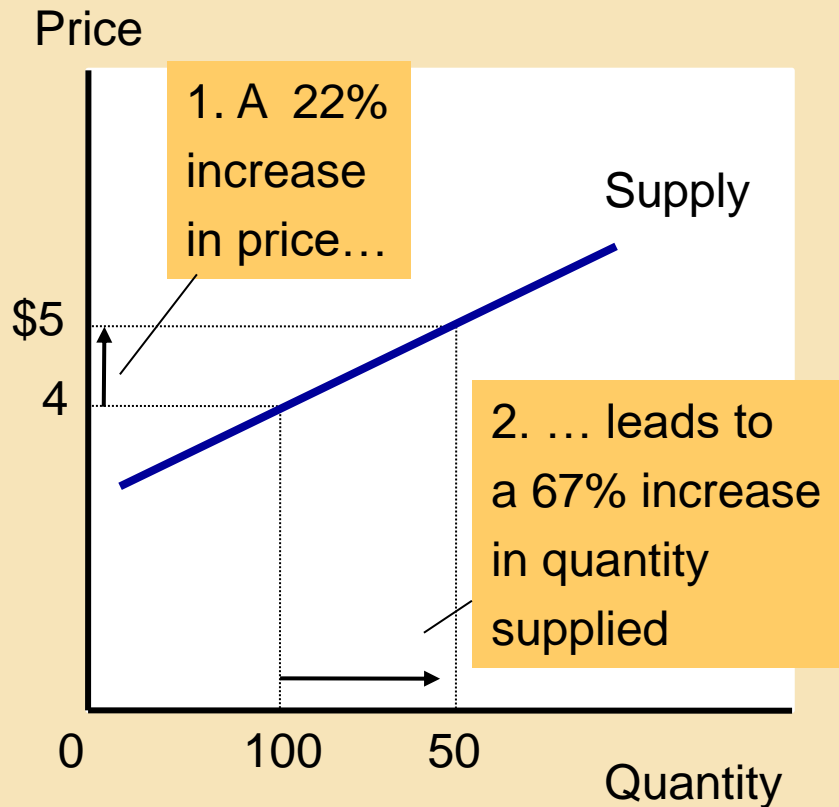


The price elasticity of supply determines whether the supply curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.

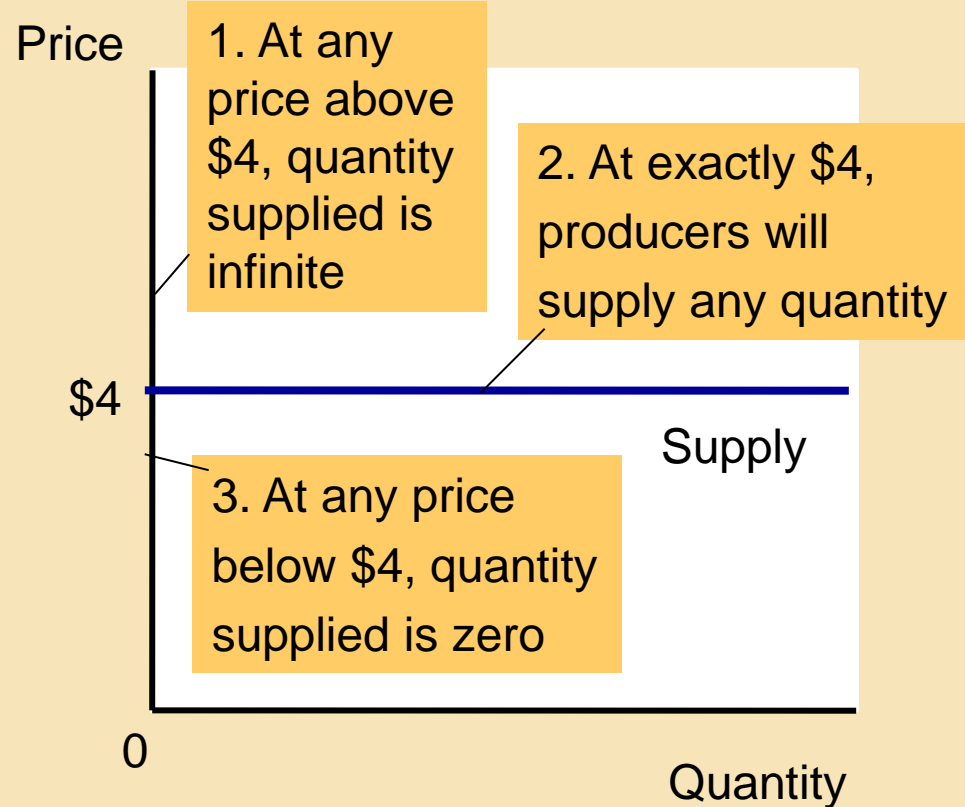
Figure 5

The Price Elasticity of Supply (d, e)

(d) Elastic Supply: Elasticity Is Greater Than 1



(e) Perfectly Elastic Supply: Elasticity Equals Infinity



The price elasticity of supply determines whether the supply curve is steep or flat. Note that all percentage changes are calculated using the midpoint method.



Applications

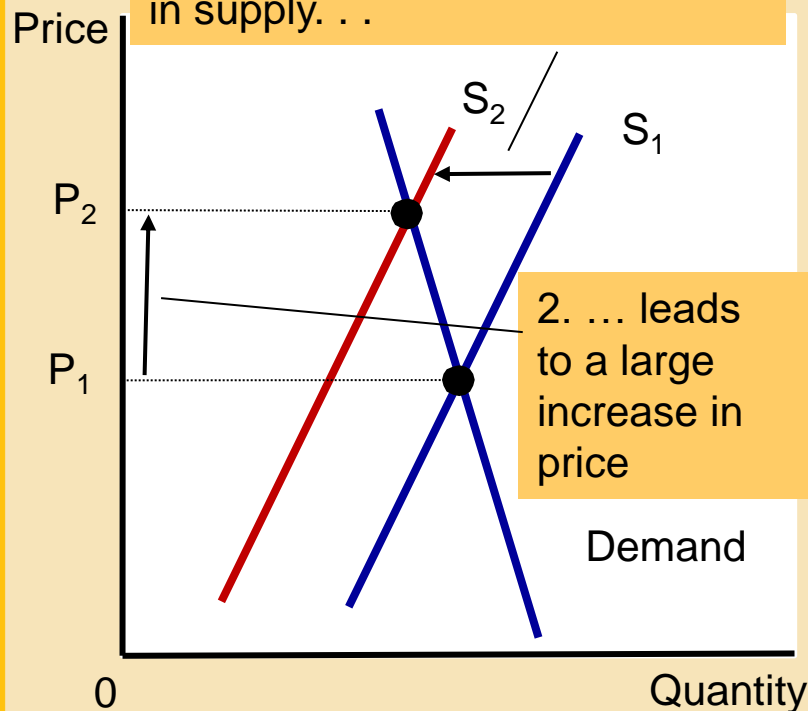
- Why Did OPEC Fail to Keep the Price of Oil High?
 - Increase in prices 1973-1974, 1971-1981
 - Short-run: supply and demand are inelastic
 - Decrease in supply: large increase in price
 - Long-run: supply and demand are elastic
 - Decrease in supply: small increase in price

Figure 8

A Reduction in Supply in the World Market for Oil

(a) The Oil Market in the Short Run

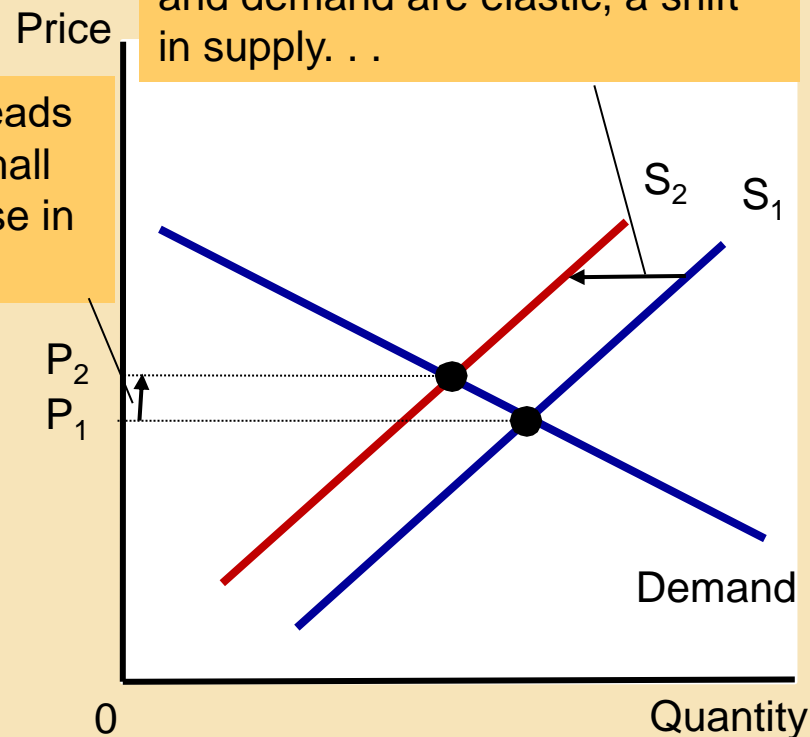
1. In the short run, when supply and demand are inelastic, a shift in supply. . .



2. ... leads to a large increase in price

(b) The Oil Market in the Long Run

1. In the long run, when supply and demand are elastic, a shift in supply. . .



2. ... leads to a small increase in price

When the supply of oil falls, the response depends on the time horizon. In the short run, supply and demand are relatively inelastic, as in panel (a). Thus, when the supply curve shifts from S_1 to S_2 , the price rises substantially. By contrast, in the long run, supply and demand are relatively elastic, as in panel (b). In this case, the same size shift in the supply curve (S_1 to S_2) causes a smaller increase in the price.