Principles of Microeconomics

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Chapter 0

Introduction

- Economics is the study of how society allocates scarce resources.
- Microeconomics is the study of how households and firms make decisions and how they interact in specific markets.
- Macroeconomics is the study of economy-wide phenomena.

Chapter 1

Supply and Demand

1.1 Markets and Competition

- A market is a group of buyers and sellers of a particular good or service.
- A competitive market is a market with so many buyers and sellers that each has a negligible impact on the market price.
- A market is perfectly competitive if:
  1. The goods/services offered for sale are all exactly the same.
  2. The buyers and sellers are so numerous that no single buyer/seller has any influence on the market price.
- Buyers and sellers in perfectly competitive markets are called price takers because they must accept the market price.

1.2 Demand

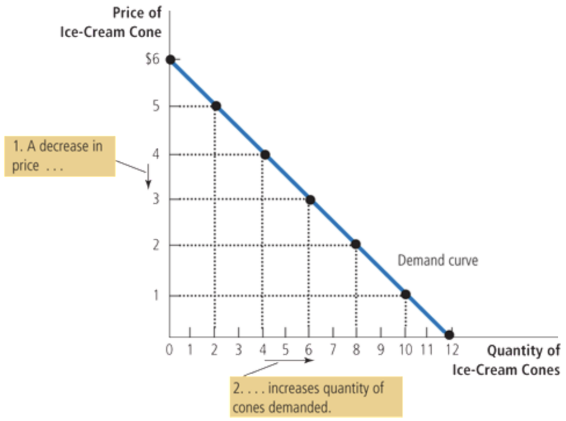
1.2.1 The Demand Curve

- The quantity demanded of a good is the amount that buyers are willing and able to purchase.
  - There are many determinants of quantity demanded, but the most important is the good's price.
- Law of Demand: Holding everything else constant, when the price of a good rises, the quantity demanded falls. When the price falls, the quantity demanded rises.
- A demand schedule is a table that shows the relationship between the price of a good and the quantity demanded (holding every other determinant of quantity demanded constant).

- The demand curve is the curve relating price and quantity demanded (holding everything else constant).
  - By convention, price is plotted on the y-axis and quantity demanded is plotted on the x-axis.

Ex. Catherine's Demand Schedule and Curve

Price of Ice-Cream Cone	Quantity of Cones Demanded
$0	12 cones
1	10
2	8
3	6
4	4
5	2
6	0



- The demand equation expresses quantity demanded as a function of price.
  - E.g. $Q_D = -2P + 12$
- The inverse demand equation expresses price as a function of quantity demanded.
  - E.g. $P = -\frac{1}{2}Q_D + 6$

1.2.2 Market Demand

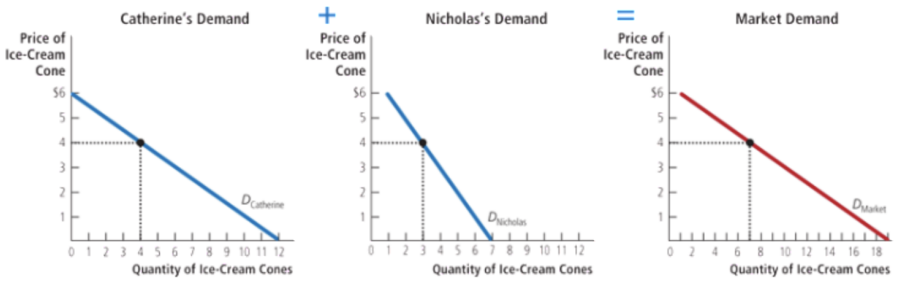
- The quantity demanded in a market is the sum of every individuals' quantity demanded at each price
  - If we know individual demand equations, we can sum them:

$$\begin{aligned} Q_{D,Catherine} &= -2P + 12 \\ + \; Q_{D,Nicholas} &= -P + 7 \\ \hline Q_{D,Mkt} &= -3P + 19 \end{aligned}$$

  - Warning: If we know individual inverse demand equations, we *cannot* sum them.

Ex. Market Demand Schedule and Demand Curve

Price of Ice-Cream Cone	Catherine		Nicholas		Market
$0	12	+	7	=	19 cones
1	10		6		16
2	8		5		13
3	6		4		10
4	4		3		7
5	2		2		4
6	0		1		1



1.2.3 Shifts in the Demand Curve

- If a determinant of quantity demanded other than price changes, the demand curve shifts.

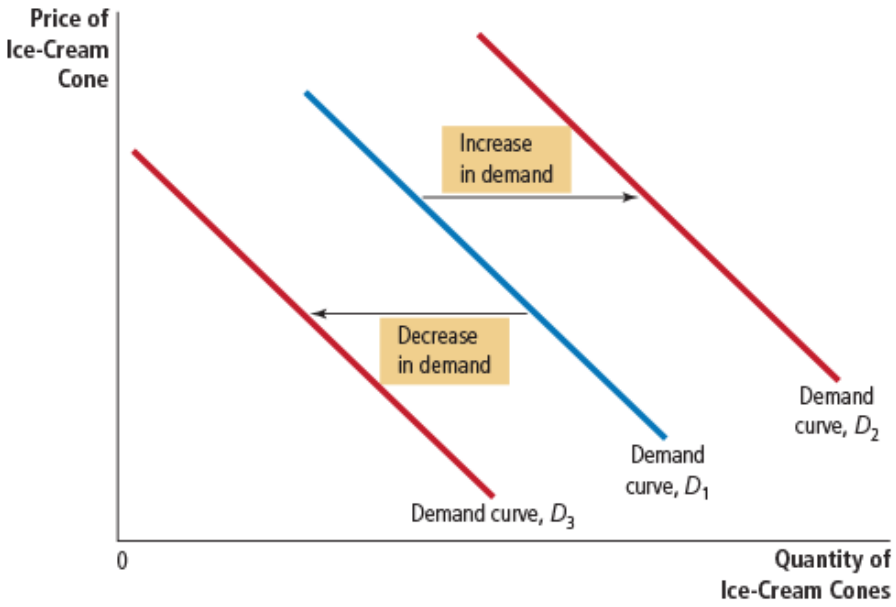
Variables That Shift the Demand Curve:

1. Income:
   - Typically, when people's income falls, their demand for a good falls. If demand for a good falls when income falls, the good is called a normal good.
   - If the demand for a good rises when income falls, the good is called an inferior good.
2. Price of Related Goods:
   - When a fall in the price of one good reduces the demand for another good, the two goods are called substitutes.
     - Substitutes are often goods that are used in place of each other, e.g. ice cream and frozen yogurt
   - When a fall in the price of one good increases the demand for another good, the two goods are called complements

– Complements are often goods that are used together, e.g. ice cream and ice cream cones.

3. Tastes:
   - If people's tastes (a.k.a. preferences) change, their quantity demanded will change, and the demand curve will shift.
4. Expectations:
   - If people expect a higher price in the future, they will demand more at today's price.
   - If people expect a higher income in the future, they will demand more today.
5. Number of Buyers:
   - An increase in the number of buyers increases demand.
   - A decrease in the number of buyers decreases demand.

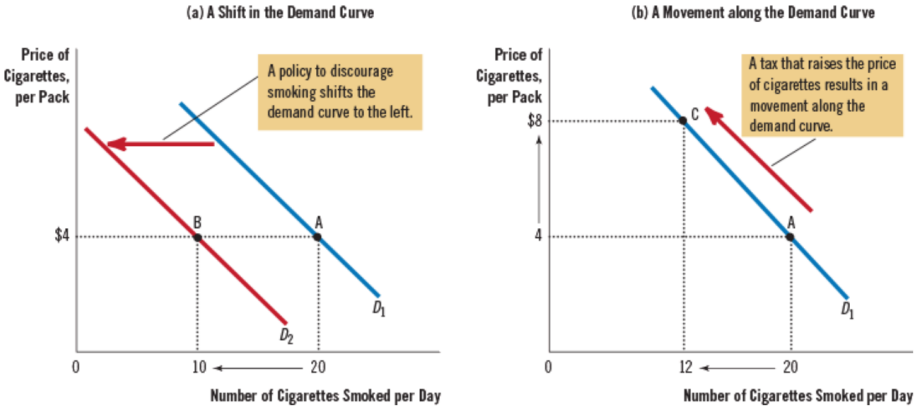
Ex. Shifts in the Demand Curve



Warning:

- A change in the price of a good does *not* shift the demand curve for the good.
- A change in the price of a good represents a movement along the demand curve.

Ex. A Shift vs. A Movement Along



1.3 Supply

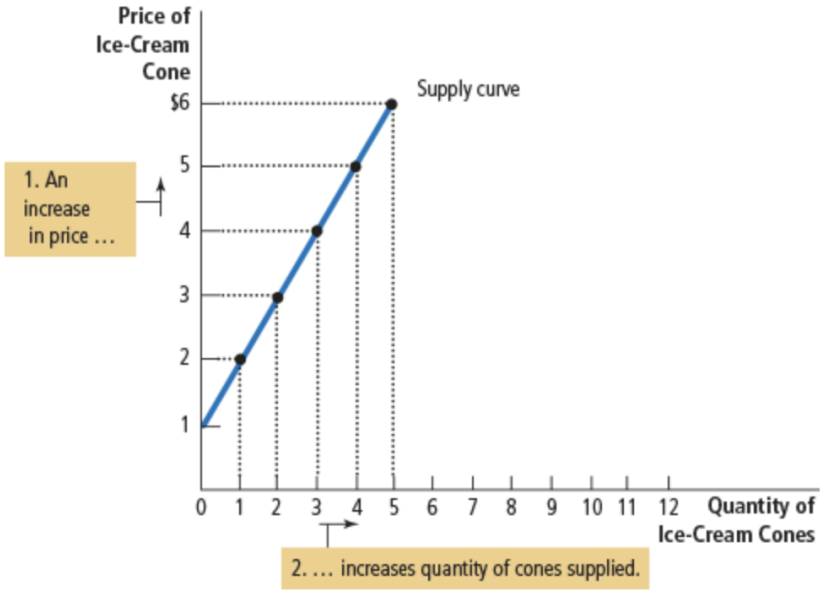
1.3.1 The Supply Curve

- The quantity supplied of a good is the amount that sellers are willing and able to sell.
  - The most important determinant of the quantity supplied of a good is the price of the good.
- Law of Supply: Holding everything else constant, when the price of a good rises, the quantity supplied rises. When the price falls, the quantity supplied falls.
- Supply schedules, curves, equations, and inverse equations – the four ways of expressing supply – are defined analogously to demand.

1.3.2 Market Supply

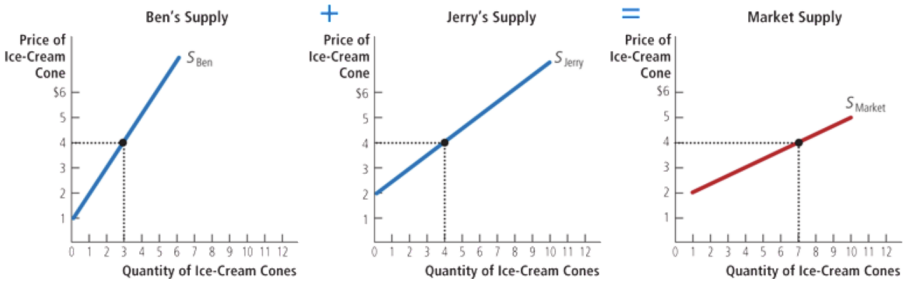
- The quantity supplied in a market is the sum of every individual's quantity supplied at each price.
  - To calculate market supply from equations, you can sum supply equations but not inverse supply equations.

Ex. Ben's Supply Curve



Ex. Market Supply Schedule and Supply Curve

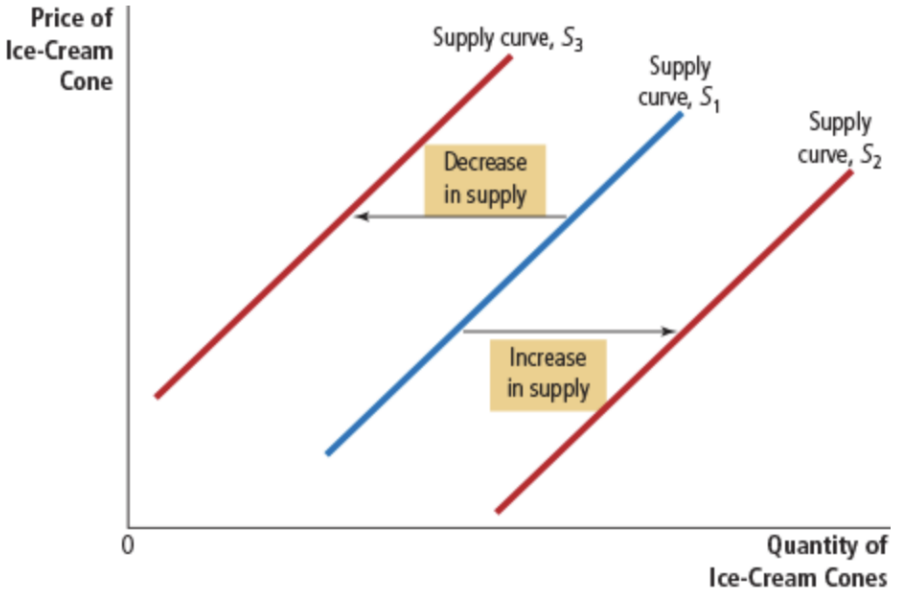
Price of Ice-Cream Cone	Ben		Jerry		Market
$0	0	+	0	=	0 cones
1	0		0		0
2	1		0		1
3	2		2		4
4	3		4		7
5	4		6		10
6	5		8		13



1.3.3 Shifts in the Supply Curve

- If a determinant of quantity supplied other than price changes, the supply curve shifts.

Ex. Shifts in the Supply Curve



Variables That Shift the Supply Curve

1. Input Prices:
   - An input is any good or service that's used to produce another good or service.
   - An increase in input prices makes production less profitable, so fewer producers are willing to supply at a given price and supply decreases.
   - Similarly, a decrease in input prices will increase supply.
2. Technology:
   - Advancement in production technology reduces costs which increases profits, so firms supply more and supply increases.
   - Similarly, a decline in production technology will decrease supply.
3. Expectations:
   - If firms expect higher prices in the future, they will postpone some production, and supply in the present will decrease.

- If firms expect lower prices in the future, they will fast forward its production, so supply in the present will increase.

4. Number of Sellers
   - An increase in the number of sellers increases supply.
   - A decrease in the number of sellers decreases supply.

Warning:

- A change in the price of a good does *not* shift the supply curve for the good.
- A change in the price of a good represents a movement along the supply curve.

1.4 Supply and Demand Together

1.4.1 Equilibrium

- A market is in equilibrium if quantity supplied equals quantity demanded.
  - Geometrically, equilibrium occurs at the point where the supply and demand curves intersect.
  - Algebraically, set the supply equation and demand equation equal to each other.

    E.g. $Q_D = 5 - P$ and $Q_S = P$.

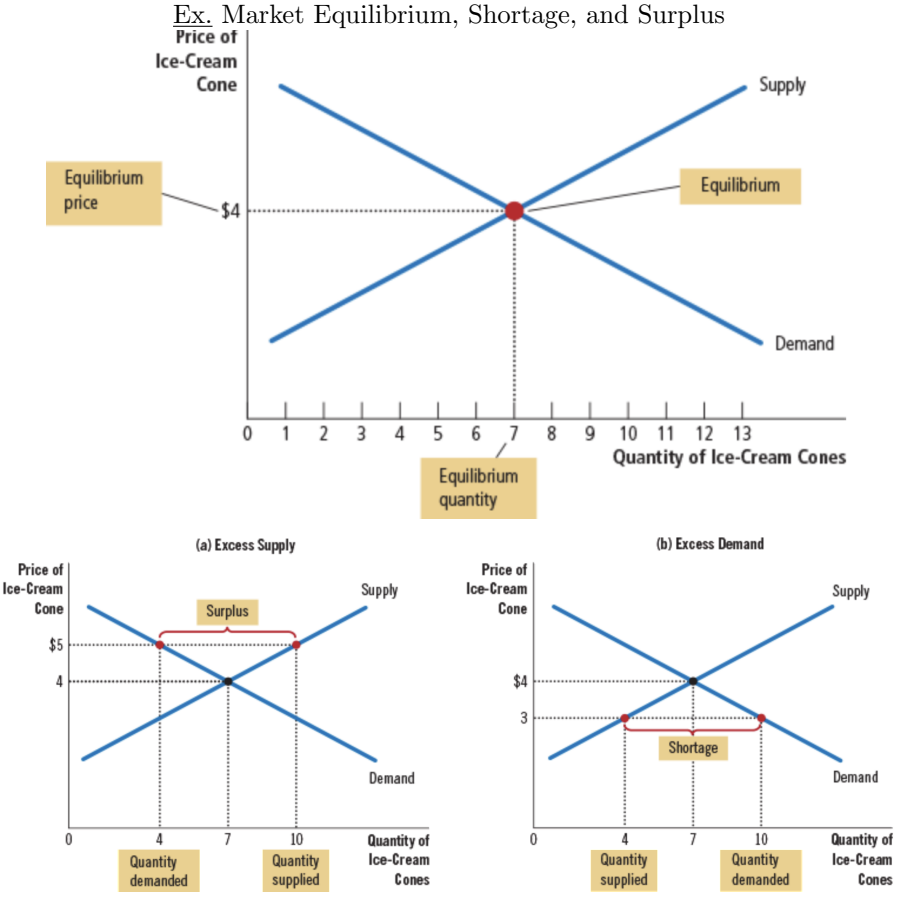
$$\begin{aligned} Q_D &= Q_S \\ 5 - P^* &= P^* \\ 5 &= 2P^* \\ 2.5 &= P^* \\ Q^* &= P^* = 2.5 \end{aligned}$$

  - The quantity at equilibrium is called the equilibrium quantity.
  - The price at equilibrium is called the equilibrium price or the market-clearing price.
- There is a surplus of a good when the quantity supplied exceeds the quantity demanded.
  - Sellers can't sell all of their goods, so they cut the price. That moves the market back towards equilibrium.
- There is a shortage when the quantity demanded exceeds the quantity supplied.

– Buyers can't buy as much as they want, so they bid up the price. That moves the market back towards equilibrium.

- In both cases, markets tend towards equilibrium (assuming perfect coompetition).

Ex. Market Equilibrium, Shortage, and Surplus



1.4.2 Analyzing Changes in Equilibrium

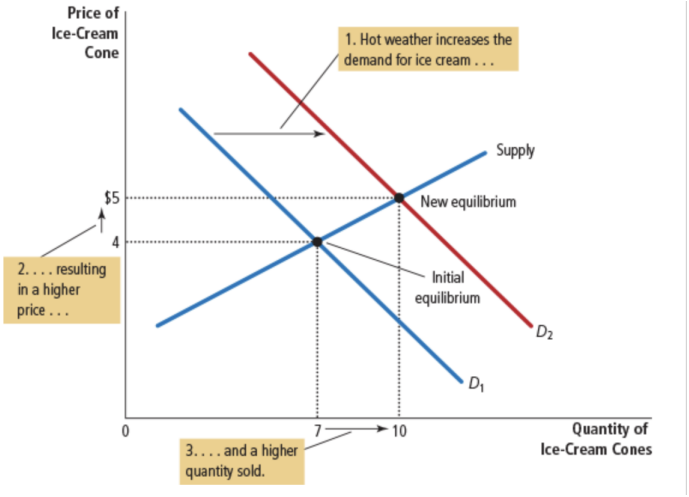
To analyze an event's effect on equilibrium, follow three steps:

1. Determine whether the event shifts supply, demand, or both.
2. Determine the direction of the shift.
3. Draw a supply-and-demand diagram to see how the new equilibrium compares to the old.

Ex. How does a heat wave affect equilibrium in the market for ice cream?

1. Hot weather increases people's preference for ice cream, so the demand curve shifts. Supply remains unchanged.
2. An increased preference for ice cream will shift the curve to the right.
3. Equilibrium price and quantity both increase.

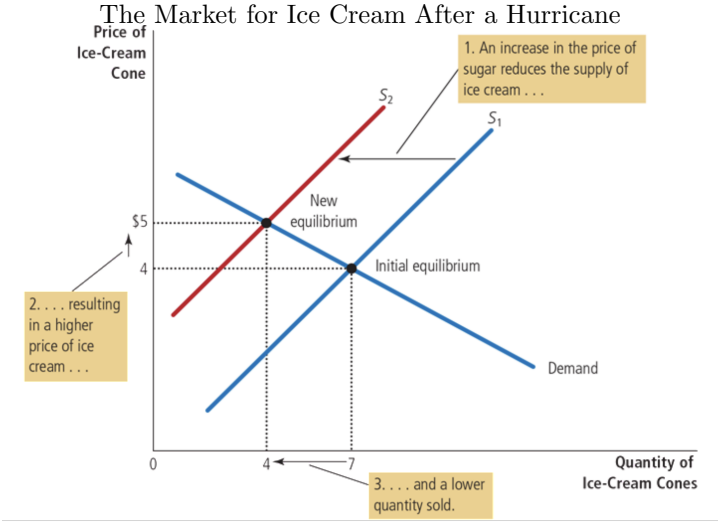
The Market for Ice Cream During a Heat Wave



Ex. A hurricane destroys part of the sugarcane crop and drives up the price of sugar. What happens to equilibrium in the market for ice cream?

1. The price of an input changed, so the supply curve shifts. Demand remains unchanged.
2. Higher input prices will shift the curve to the left.
3. Equilibrium price increases and equilibrium quantity decreases.

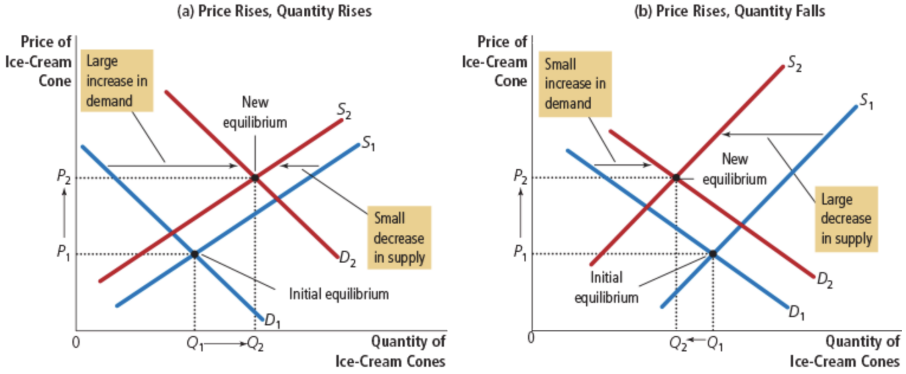
The Market for Ice Cream After a Hurricane



Ex. The heat wave and hurricane happen in the same summer. What happens to equilibrium?

1. Demand and supply both shift for the same reasons as above.
2. Demand shifts right, and supply shifts left for the same reasons as above.
3. The equilibrium price increases. The change in equilibrium quantity is ambiguous. It depends on the relative sizes of the shifts.

The Market for Ice Cream During a Heat Wave and After a Hurricane



Chapter 2

Elasticities

2.1 The Elasticity of Demand

2.1.1 The Price Elasticity of Demand

- A good's price elasticity of demand measures how much the quantity demanded responds to a change in price.
- Demand for a good is elastic if the quantity demanded responds a lot to changes in price.
- Demand is inelastic if the quantity demanded doesn't respond a lot to changes in price.

Determinants of Price Elasticity of Demand

1. Availability of Substitutes: Goods with close substitutes are more elastic.
2. Necessities v. Luxuries: Necessities are more inelastic and luxuries are more elastic.
3. Market Definition: Goods in narrowly defined markets are more elastic, and goods in broadly defined markets are more inelastic.
4. Time Horizon: Goods are more elastic in the long term than the short term.

2.1.2 Computing the Price Elasticity of Demand

- Price elasticity of demand is

$$\eta = \left| \frac{\%\Delta Q_D}{\%\Delta P} \right|$$

- Ex. The price of ice-cream increases by 10%, and the quantity bought decreases by 20%. The price elasticity of demand is:

$$\eta = \left| \frac{-20\%}{10\%} \right| = 2$$

2.1.3 The Midpoint Method

- Problem: The typical percent change calculation depends on the initial point.
- Ex.

$$Point\ A:\ P_A = \$4,\ Q_A = 120$$
$$Point\ B:\ P_B = \$6,\ Q_B = 80$$

$$\%\Delta P_{A\to B} = \frac{P_B - P_A}{P_A} = \frac{6-4}{4} = \frac{1}{2}$$
$$\%\Delta P_{B\to A} = \frac{P_A - P_B}{P_B} = \frac{4-6}{6} = -\frac{1}{3}$$

- Solution: The midpoint method calculates percent change by using the midpoint of the two values in the denominator.
- Ex.

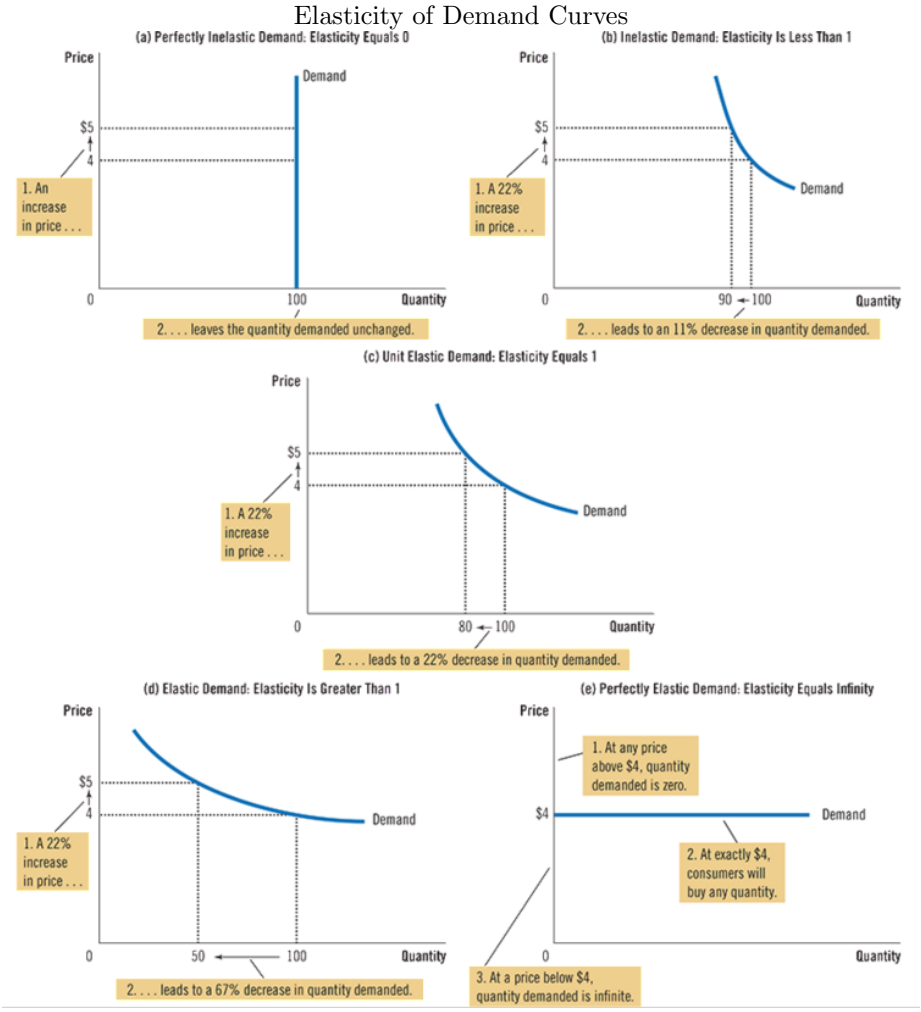
$$\%\Delta P = \frac{P_B - P_A}{\frac{P_A+P_B}{2}} = \frac{6-4}{\frac{4+6}{2}} = \frac{2}{5} = 40\%$$

- To calculate elasticities, use the midpoint method.
- Ex.

$$\eta = \left| \frac{\%\Delta Q}{\%\Delta P} \right|$$
$$\%\Delta Q = \frac{Q_A - Q_B}{\frac{Q_A+Q_B}{2}} = \frac{120-80}{\frac{120+80}{2}} = \frac{2}{5}$$
$$\%\Delta P = \frac{P_A - P_B}{\frac{P_A+P_B}{2}} = \frac{4-6}{\frac{4+6}{2}} = -\frac{2}{5}$$
$$\eta = 1$$

2.1.4 Classifying Demand Curves

- Demand is elastic when the elasticity is greater than 1.
- Demand is inelastic when the elasticity is less than 1.
- Demand is unit elastic when the elasticity equals 1.
- The flatter a demand curve is, the more elastic it is.



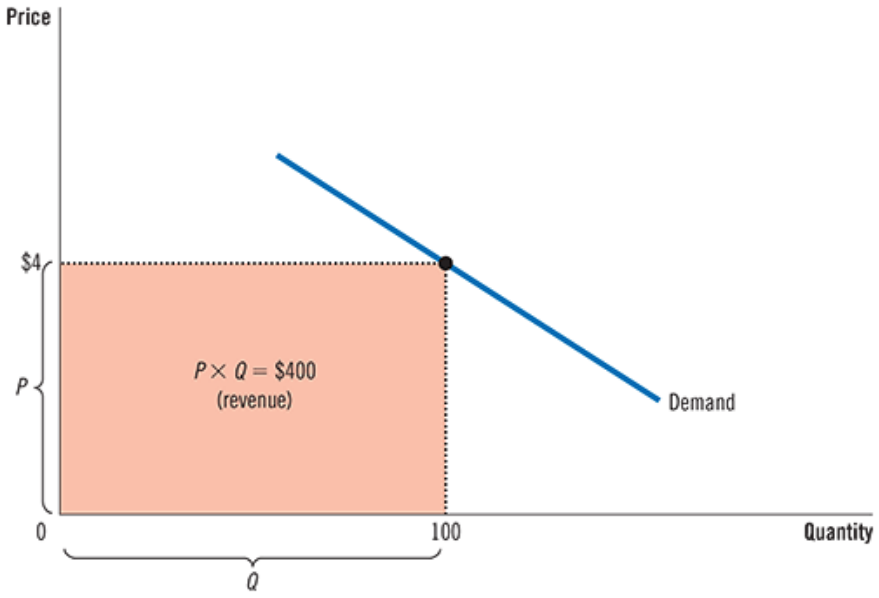
2.1.5 Total Revenue and Price Elasticity of Demand

- Total Revenue in a market is the amount paid by buyers and received by sellers.
- Algebraically,

$$TR = P \times Q$$

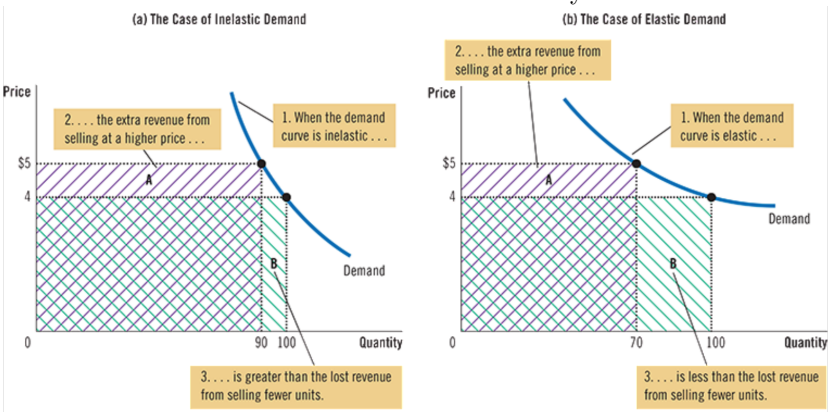
- Graphically,

Total Revenue



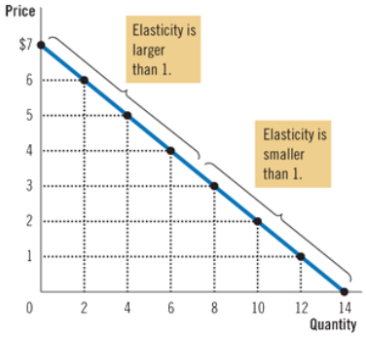
- The price elasticity of demand determines how a price change affects total revenue
- If demand is inelastic, an increase in price increases total revenue
- If demand is elastic, an increase in price decreases total revenue

Total Revenue and Elasticity



2.1.6 Price Elasticity of Demand for Linear Demand Curves

- The elasticity of linear demand curves is non-constant



Price	Quantity	Total Revenue (Price × Quantity)	Percentage Change in Price	Percentage Change in Quantity	Elasticity	Description
$7	0	$0				
			15	200	13.0	Elastic
6	2	12				
			18	67	3.7	Elastic
5	4	20				
			22	40	1.8	Elastic
4	6	24				
			29	29	1.0	Unit elastic
3	8	24				
			40	22	0.6	Inelastic
2	10	20				
			67	18	0.3	Inelastic
1	12	12				
			200	15	0.1	Inelastic
0	14	0				

2.1.7 Other Demand Elasticities

- The income elasticity of demand measures how the quantity demanded changes as consumer income changes.

$$\text{Income elasticity of demand} = \frac{\%\Delta Q_D}{\%\Delta I}$$

  - Normal goods have positive income elasticities of demand.
  - Inferior goods have negative income elasticities of demand.

- The cross-price elasticity of demand measures how the quantity demanded of one good responds to a change in the price of another good.

$$\text{Cross-price elasticity of demand} = \frac{\%\Delta Q_{D,X}}{\%\Delta P_Y}$$

  - Substitutes have positive cross-price elasticities of demand.
  - Complements have negative cross-price elasticities of demand.