



Elasticity and Its Applications

Elasticity . . .

- ... allows us to analyze supply and demand with greater precision.
- ... is a measure of how much buyers and sellers respond to changes in market conditions

The Elasticity of Demand

- ▶ The law of demand tells us that, other things equal, consumers will buy more of a product when its price declines and less when its price increases.
- ▶ But how much more or less will they buy?

The Elasticity of Demand

- ▶ *Price elasticity of demand* is a measure of how much the quantity demanded of a good responds to a change in the price of that good.
- ▶ Price elasticity of demand is the percentage change in quantity demanded given a percent change in the price.



The Price Elasticity of Demand and Its Determinants

- Availability of Close Substitutes
- Necessities versus Luxuries
- Definition of the Market
- Time Horizon

The Price Elasticity of Demand and Its Determinants

- Demand tends to be more elastic :
 - the larger the number of close substitutes
 - if the good is a luxury
 - the more narrowly defined the market
 - the longer the time period

Computing the Price Elasticity of Demand

- ➔ The price elasticity of demand is computed as the percentage change in the quantity demanded divided by the percentage change in price.

$$\text{Price elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

Computing the Price Elasticity of Demand

- ▶ We know from the downsloping demand curve that price and quantity demanded are inversely related. Thus, the price-elasticity coefficient of demand E_d will always be a negative number.
- ▶ Economists usually ignore the minus sign and simply present the absolute value of the elasticity coefficient to avoid an ambiguity that might otherwise arise.

The Midpoint Method: A Better Way to Calculate Percentage Changes and Elasticities

- The midpoint formula is preferable when calculating the price elasticity of demand because it gives the same answer regardless of the direction of the change.

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

The Variety of Demand Curves

➤ Inelastic Demand

- Quantity demanded does not respond strongly to price changes.
- Price elasticity of demand is less than one.

➤ Elastic Demand

- Quantity demanded responds strongly to changes in price.
- Price elasticity of demand is greater than one.

The Variety of Demand Curves

➤ Perfectly Inelastic

- Quantity demanded does not respond to price changes.

➤ Perfectly Elastic

- Quantity demanded changes infinitely with any change in price.

➤ Unit Elastic

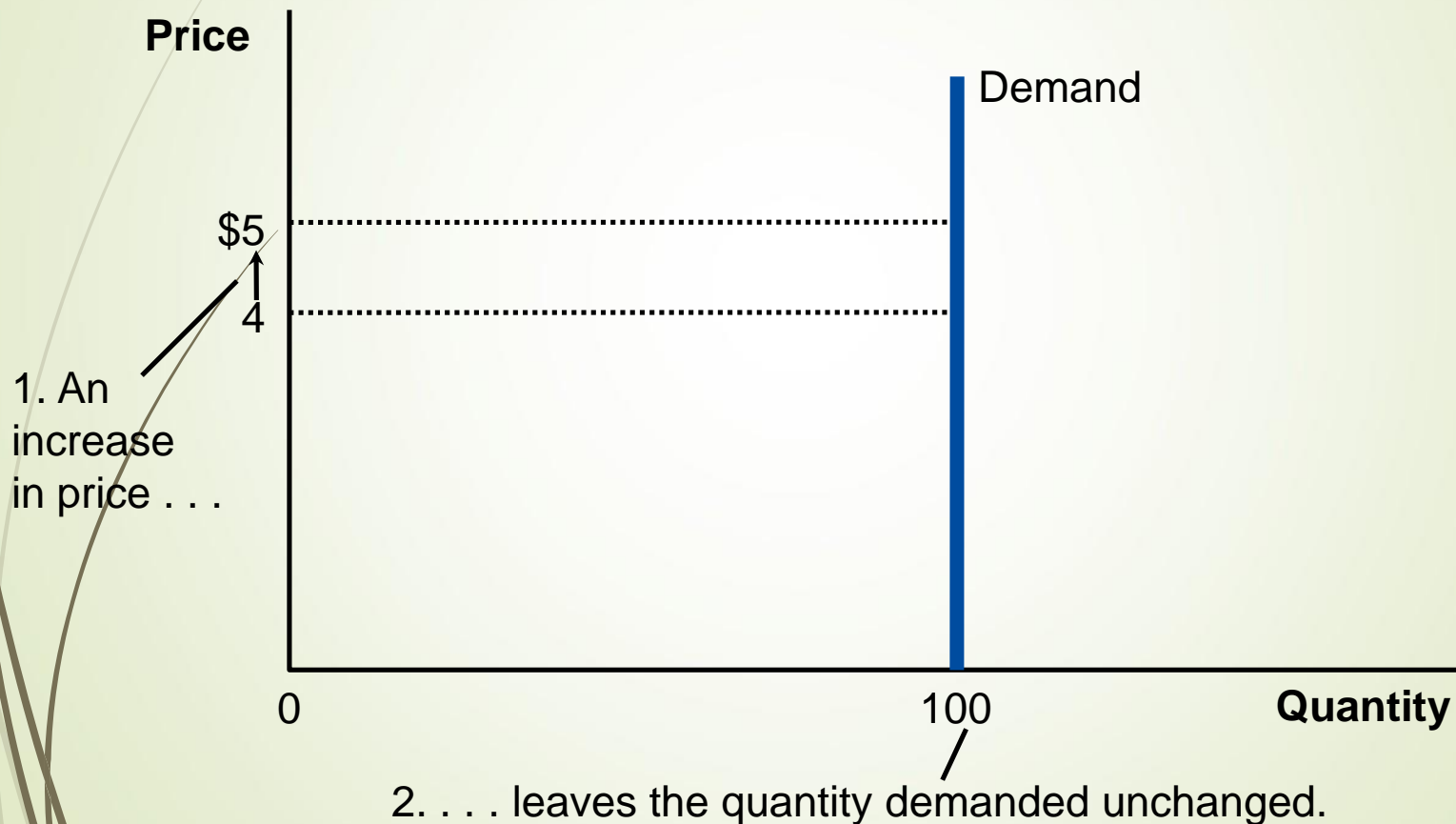
- Quantity demanded changes by the same percentage as the price.

The Variety of Demand Curves

- Because the price elasticity of demand measures how much quantity demanded responds to the price, it is closely related to the slope of the demand curve.

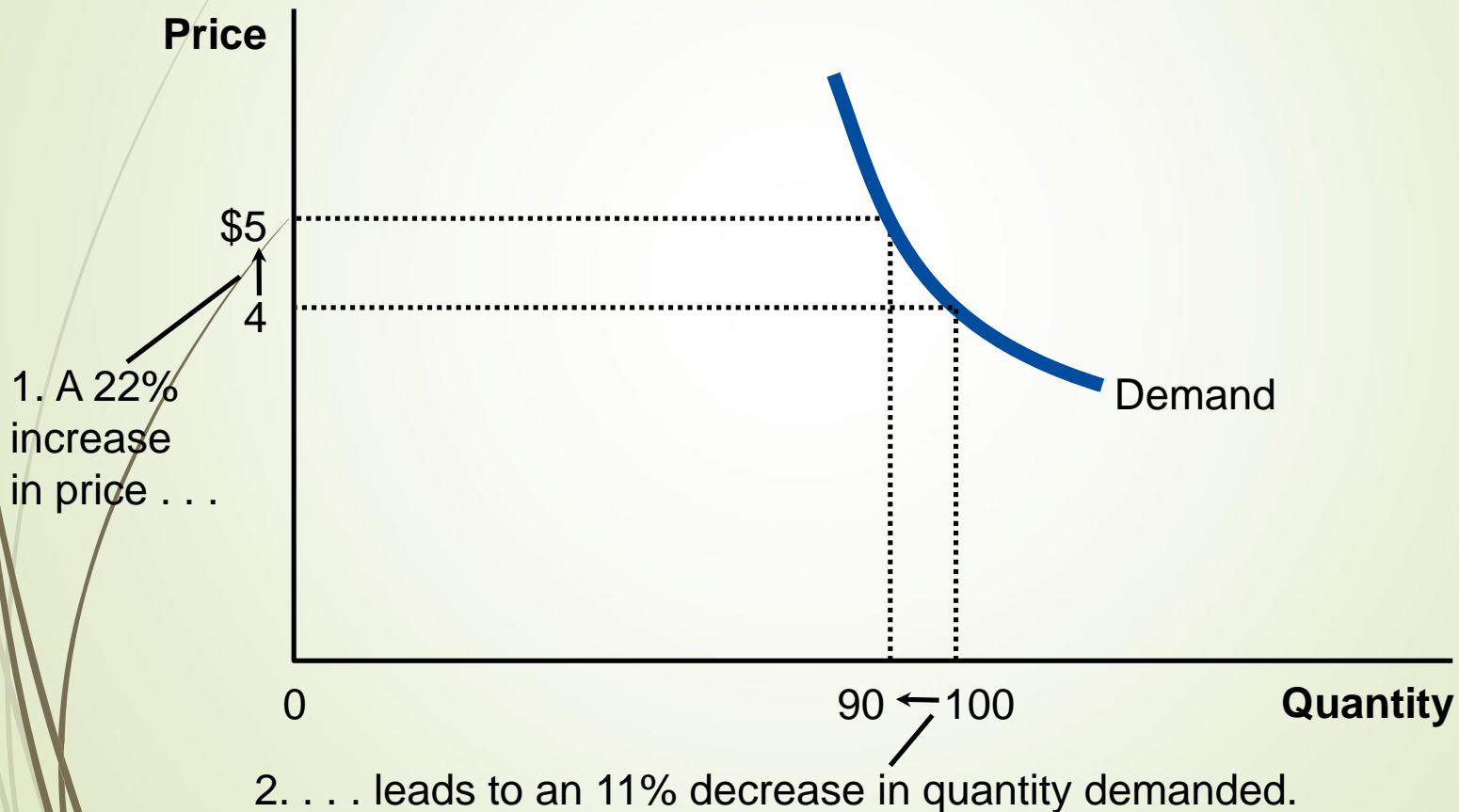
The Price Elasticity of Demand

(a) Perfectly Inelastic Demand: Elasticity Equals 0



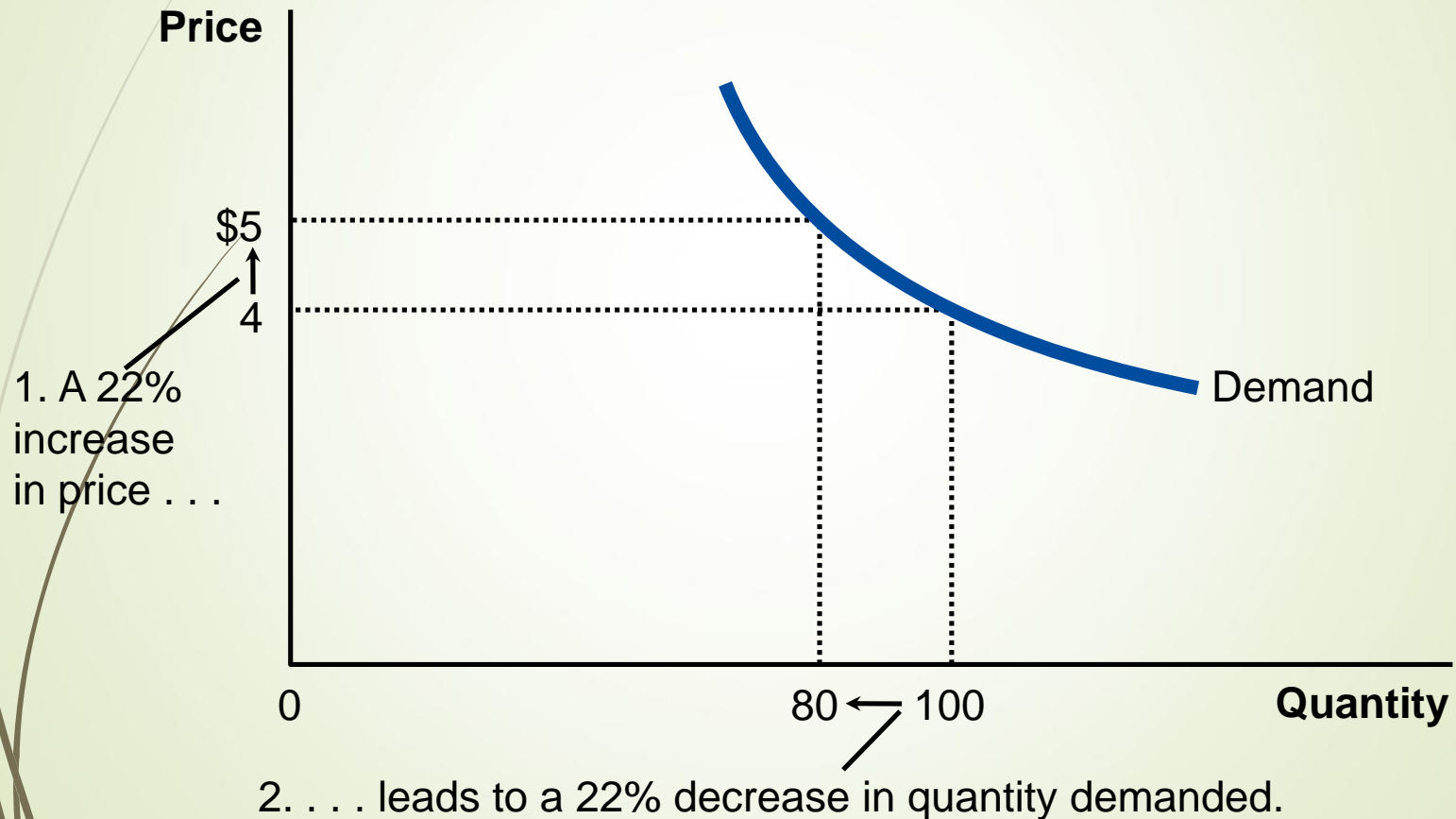
The Price Elasticity of Demand

(b) Inelastic Demand: Elasticity Is Less Than 1



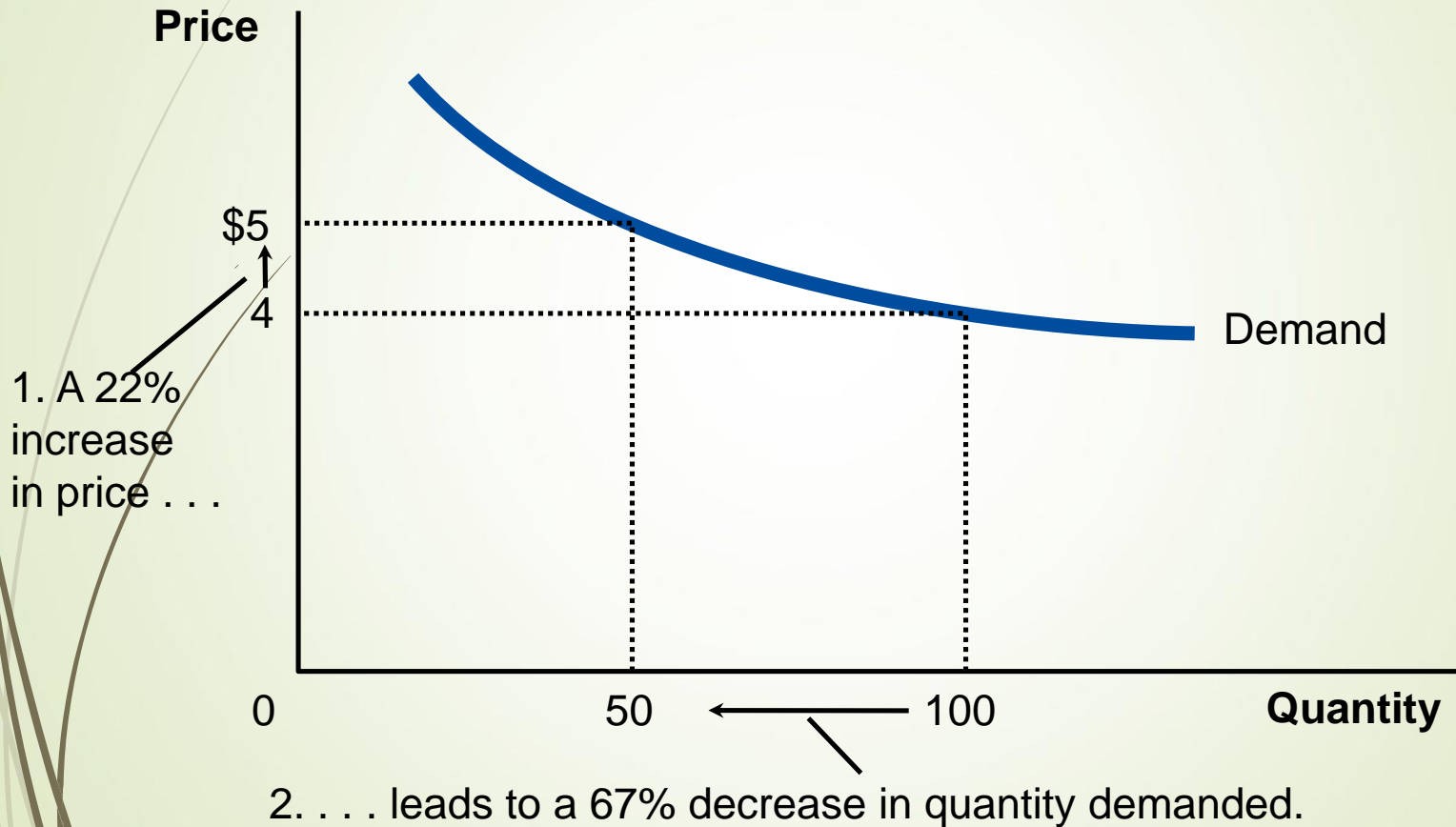
The Price Elasticity of Demand

(c) Unit Elastic Demand: Elasticity Equals 1



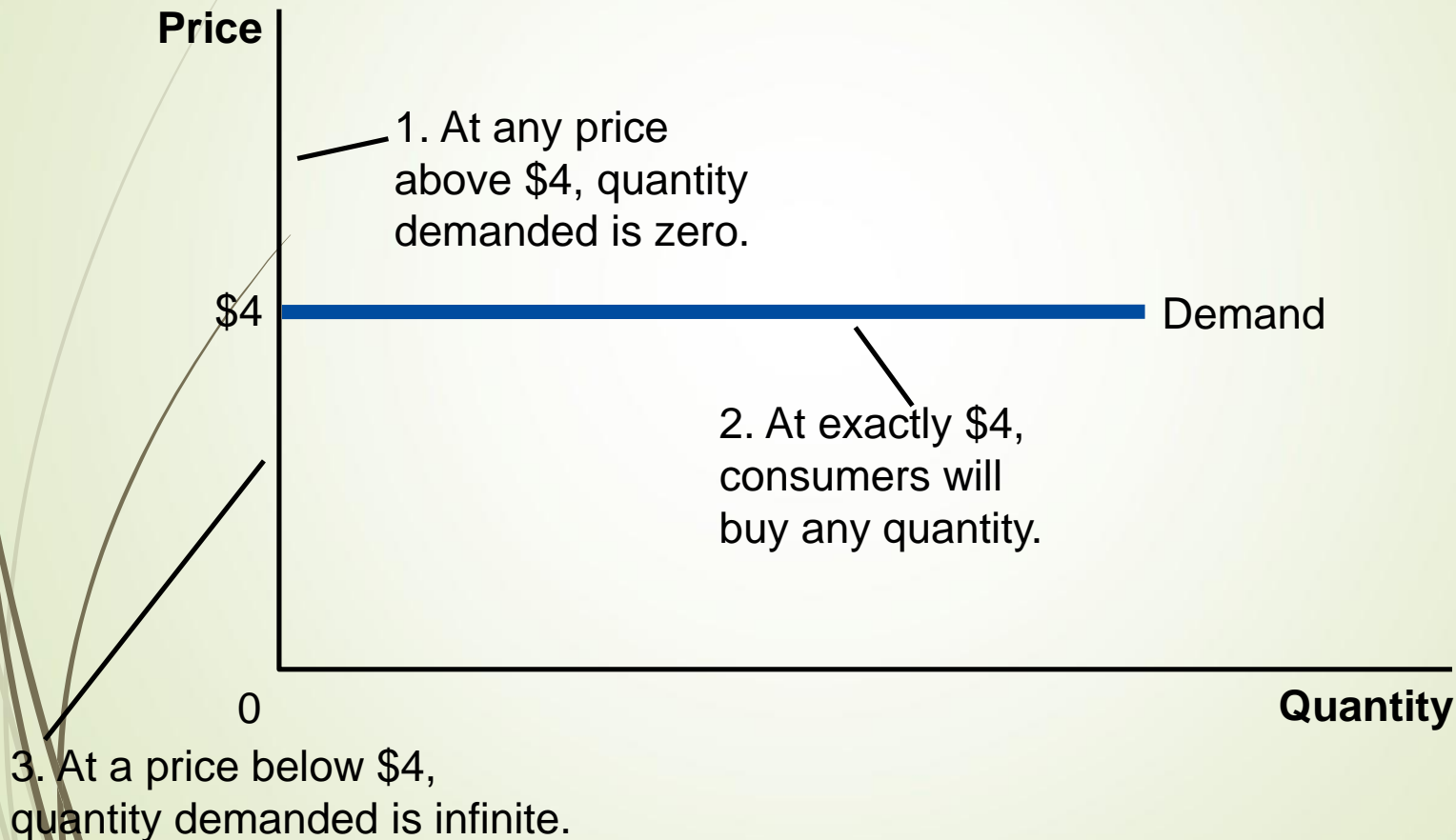
The Price Elasticity of Demand

(d) Elastic Demand: Elasticity Is Greater Than 1



The Price Elasticity of Demand

(e) Perfectly Elastic Demand: Elasticity Equals Infinity





The Price Elasticity of Demand

- Demand is typically elastic in the high-price (low-quantity) range of the demand curve and inelastic in the low-price (high-quantity) range of the curve.

Total Revenue and the Price Elasticity of Demand

- ▶ *Total revenue* is the amount paid by buyers and received by sellers of a good.
- ▶ Computed as the price of the good times the quantity sold.

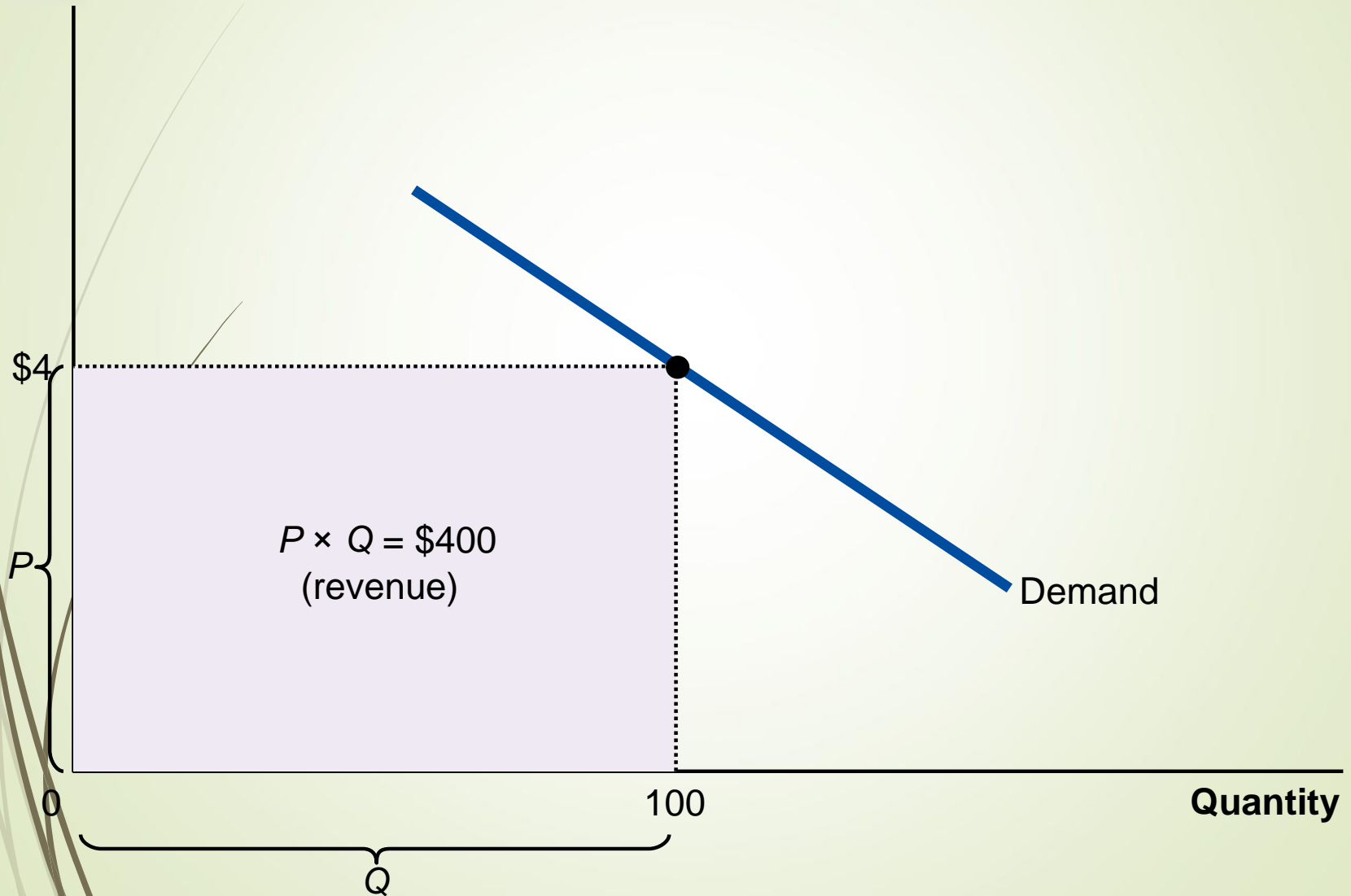
$$TR = P \times Q$$

Total Revenue and the Price Elasticity of Demand

- ▶ Graphically, total revenue is represented by the $P \times Q$ rectangle lying below a point on a demand curve.
- ▶ We know from basic geometry that the area of a rectangle is found by multiplying one side by the other.

Total Revenue

Price





Total Revenue and the Price Elasticity of Demand

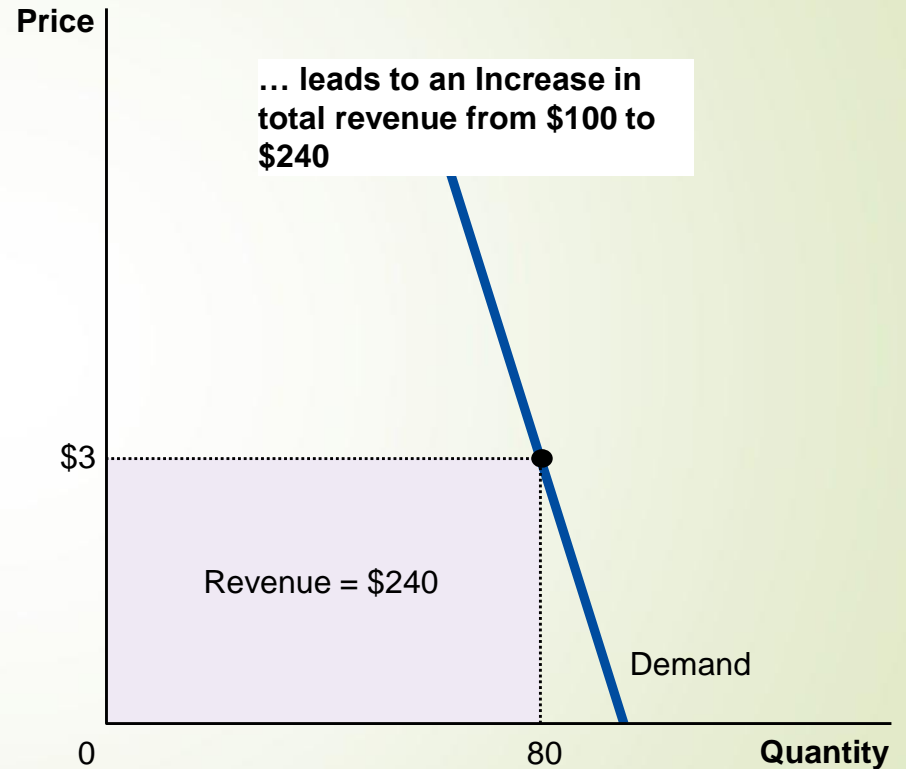
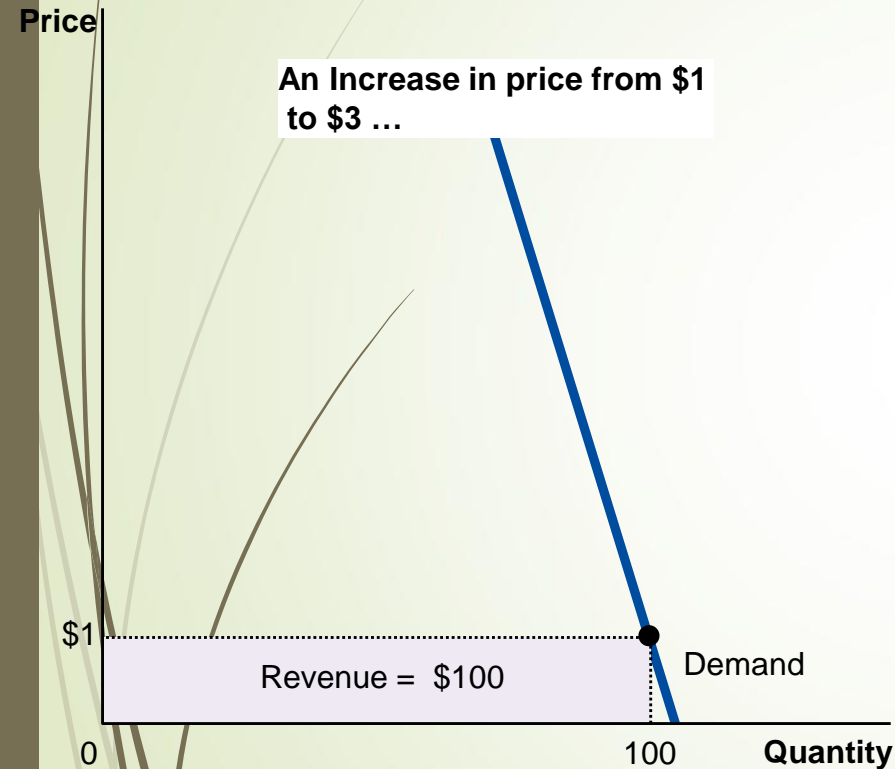
- ▶ Total revenue and the price elasticity of demand are related. In fact, the easiest way to infer whether demand is elastic or inelastic is to employ the total-revenue test. Here is the test: Note what happens to total revenue when price changes. If total revenue changes in the opposite direction from price, demand is elastic. If total revenue changes in the same direction as price, demand is inelastic. If total revenue does not change when price changes, demand is unit-elastic.



Elasticity and Total Revenue along a Linear Demand Curve

- ➔ With an inelastic demand curve, an increase in price leads to a decrease in quantity that is proportionately smaller. Thus, *total revenue increases*.

How Total Revenue Changes When Price Changes: Inelastic Demand

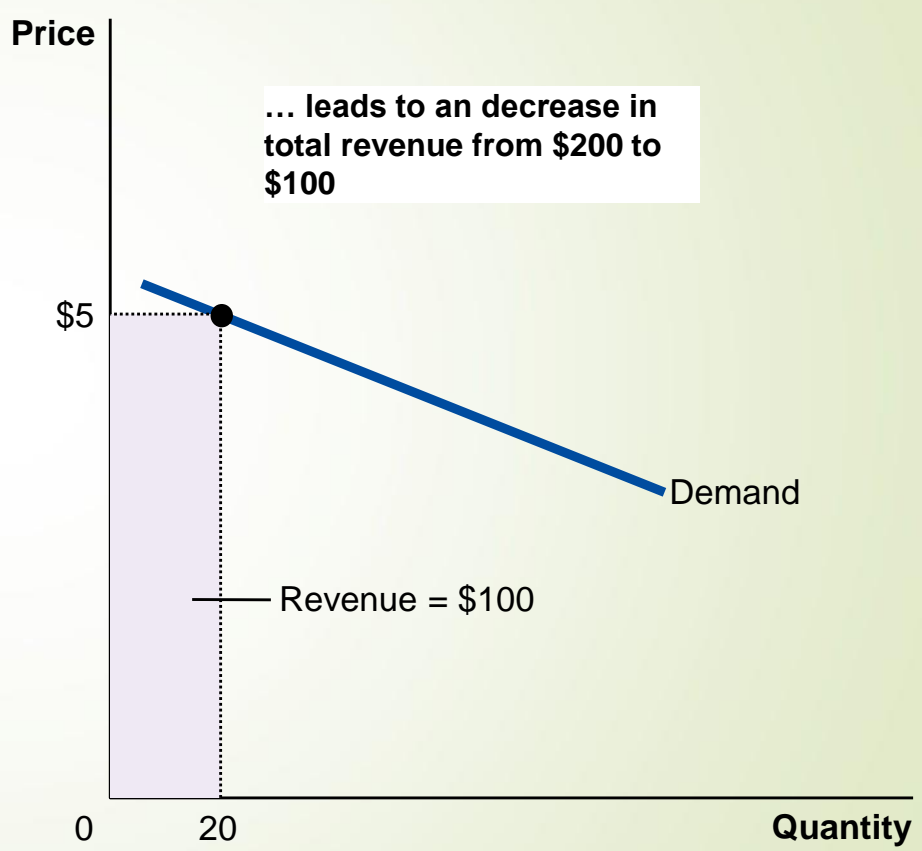
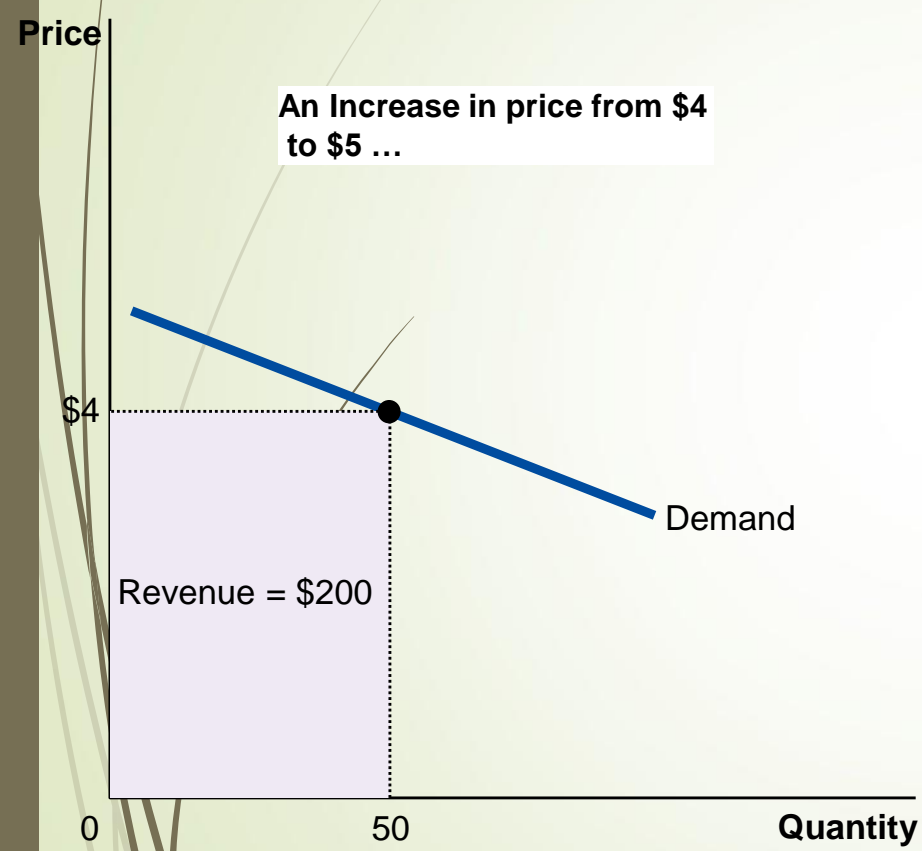




Elasticity and Total Revenue along a Linear Demand Curve

- ➔ With an elastic demand curve, an increase in the price leads to a decrease in quantity demanded that is proportionately larger. Thus, *total revenue decreases*.

How Total Revenue Changes When Price Changes: Elastic Demand



Income Elasticity of Demand

- *Income elasticity of demand* measures how much the quantity demanded of a good responds to a change in consumers' income.
- It is computed as the percentage change in the quantity demanded divided by the percentage change in income.

$$\text{Income elasticity of demand} = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in income}}$$

Income Elasticity

➤ Types of Goods

- Normal Goods
- Inferior Goods

➤ Higher income raises the quantity demanded for normal goods but lowers the quantity demanded for inferior goods.

Income Elasticity

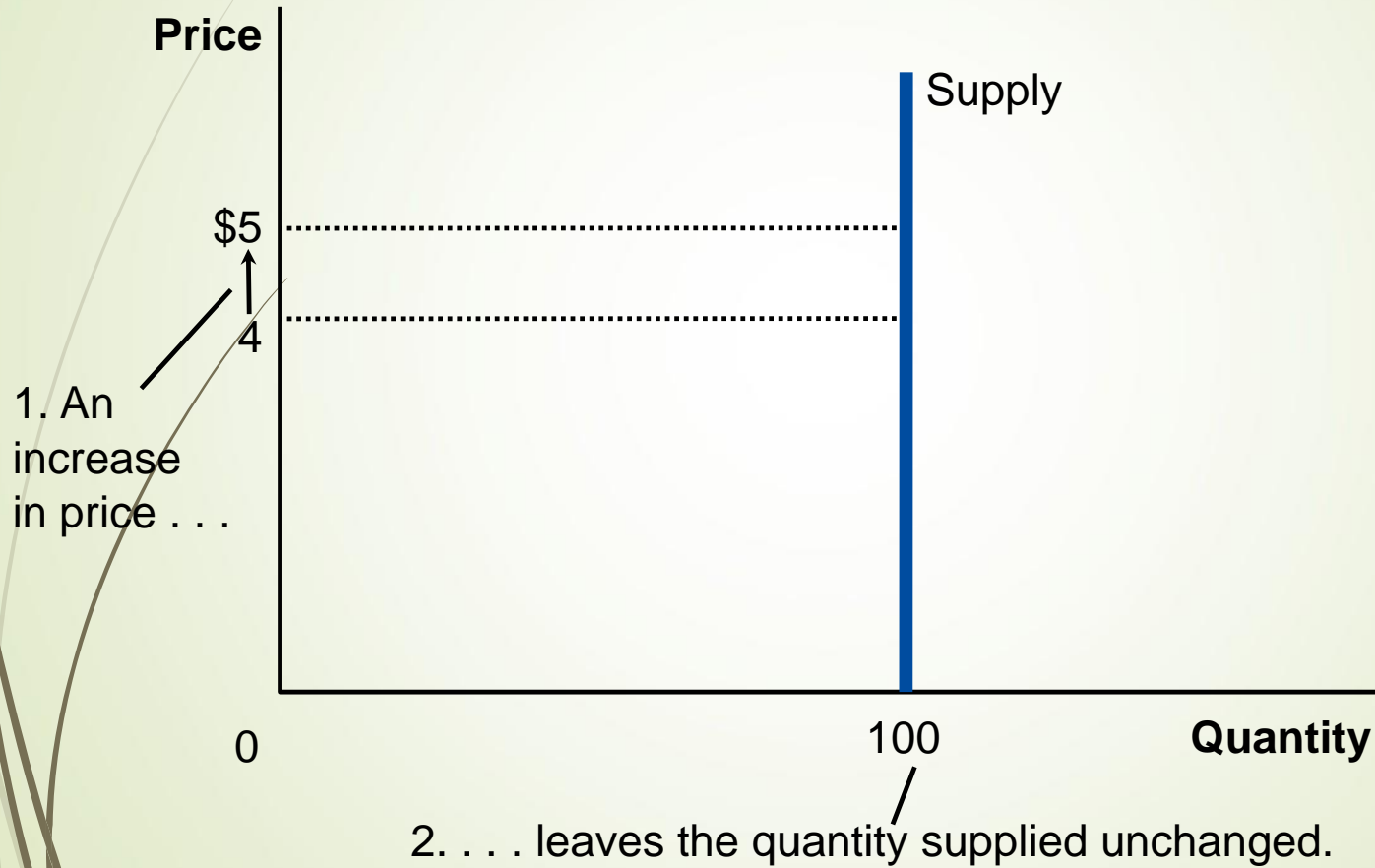
- Goods consumers regard as necessities tend to be income inelastic
 - Examples include food, fuel, clothing, utilities, and medical services.
- Goods consumers regard as luxuries tend to be income elastic.
 - Examples include sports cars, furs, and expensive foods.

The Elasticity of Supply

- ▶ *Price elasticity of supply* is a measure of how much the quantity supplied of a good responds to a change in the price of that good.
- ▶ Price elasticity of supply is the percentage change in quantity supplied resulting from a percent change in price.

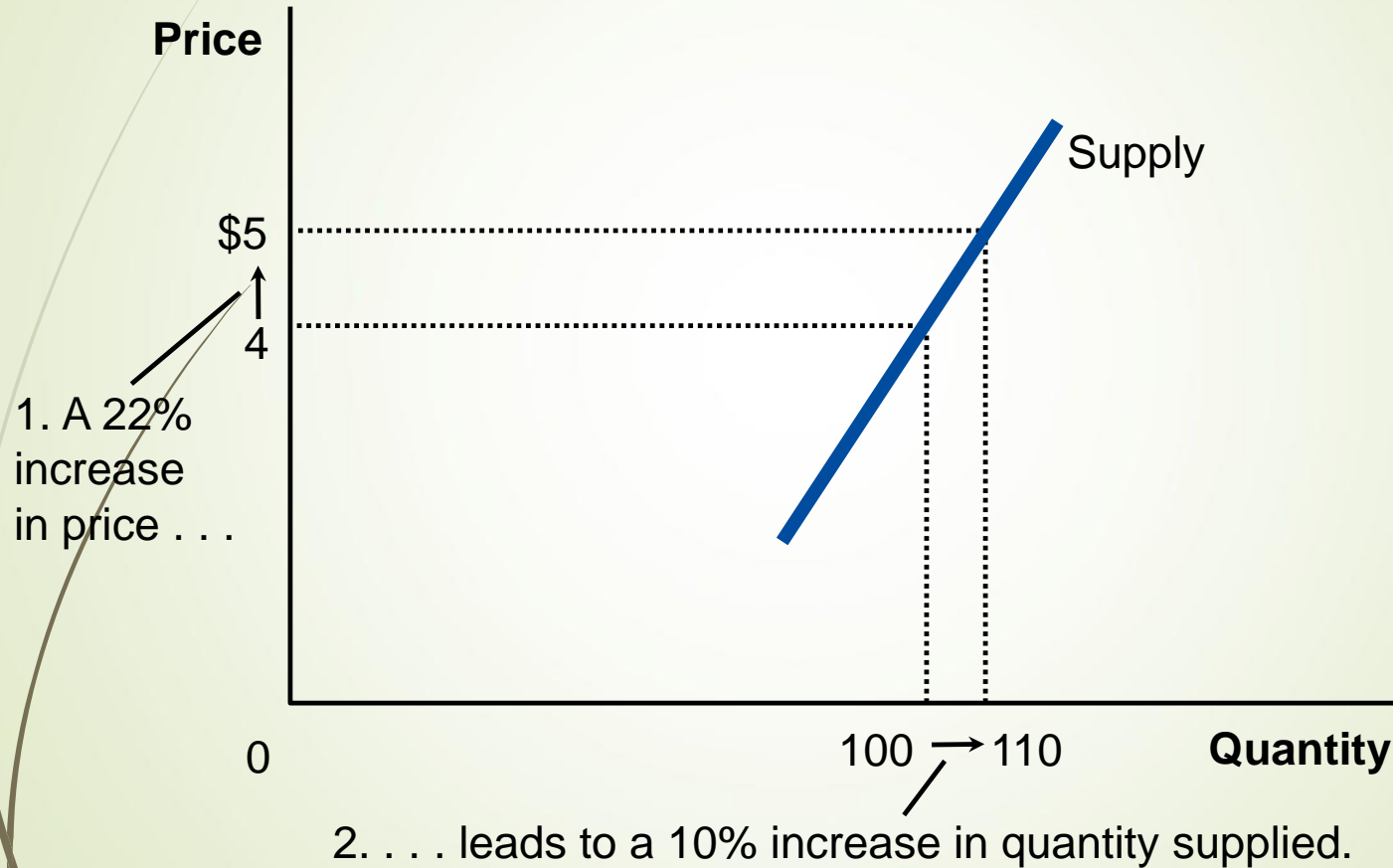
The Price Elasticity of Supply

(a) Perfectly Inelastic Supply: Elasticity Equals 0



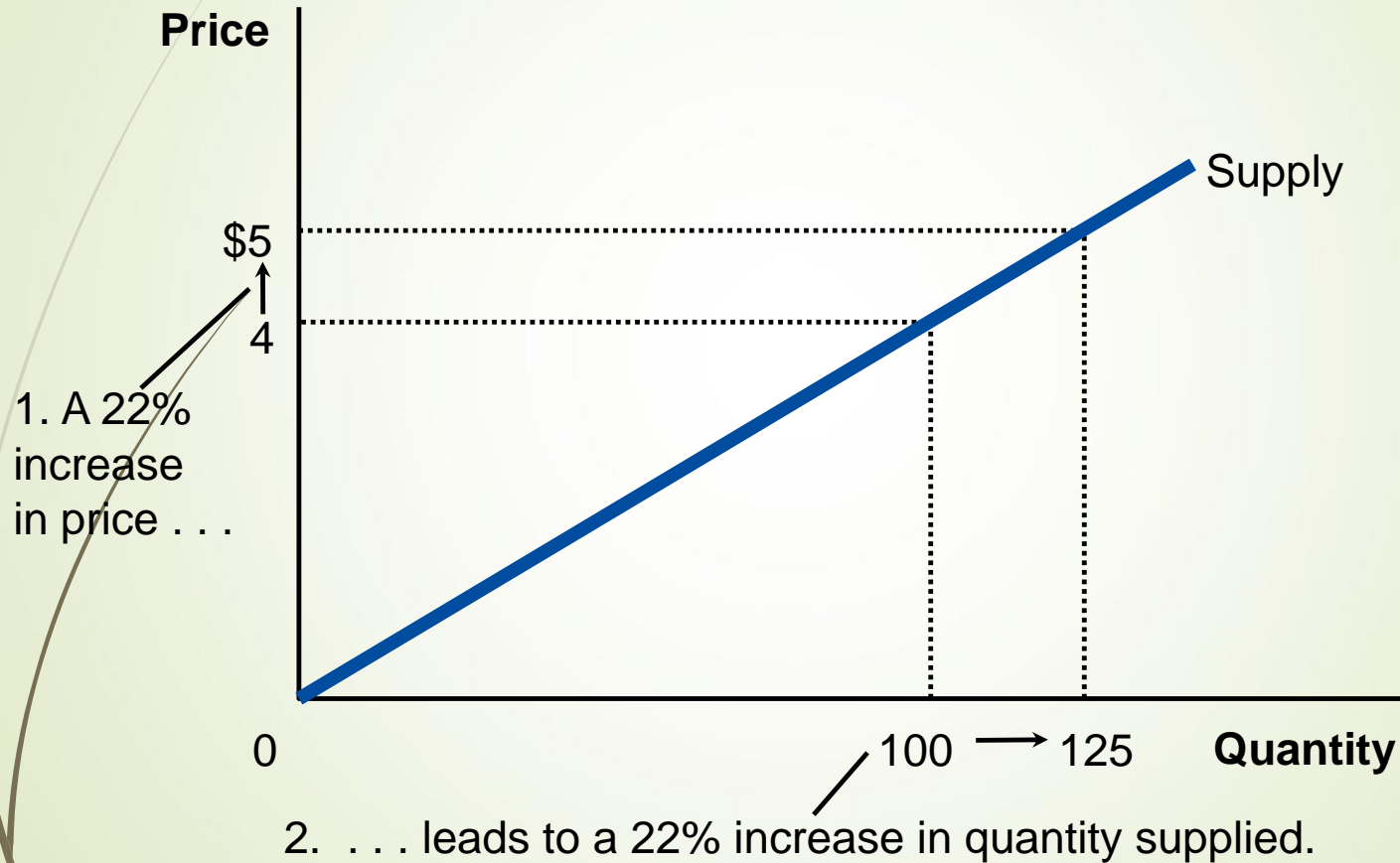
The Price Elasticity of Supply

(b) Inelastic Supply: Elasticity Is Less Than 1



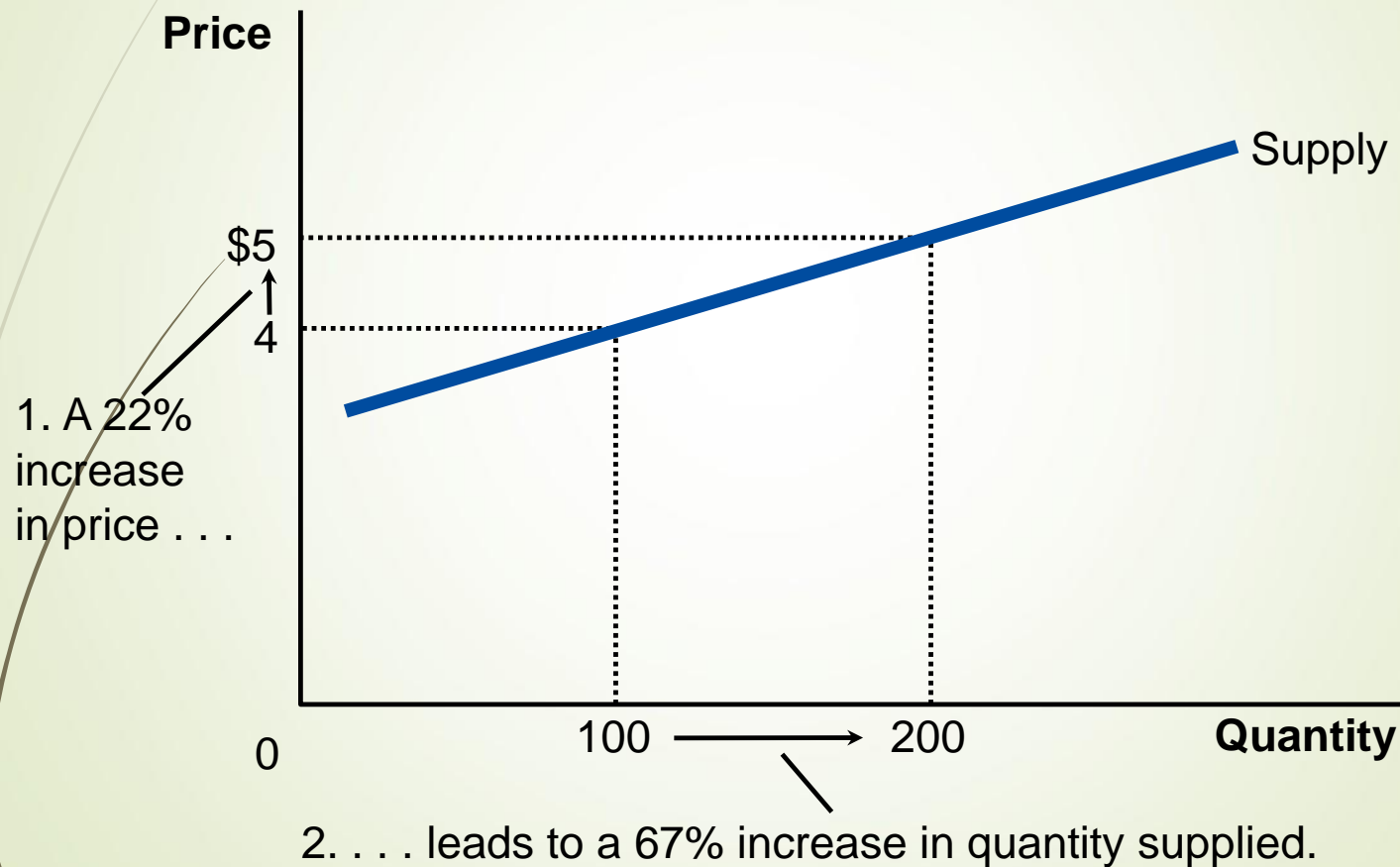
The Price Elasticity of Supply

(c) Unit Elastic Supply: Elasticity Equals 1



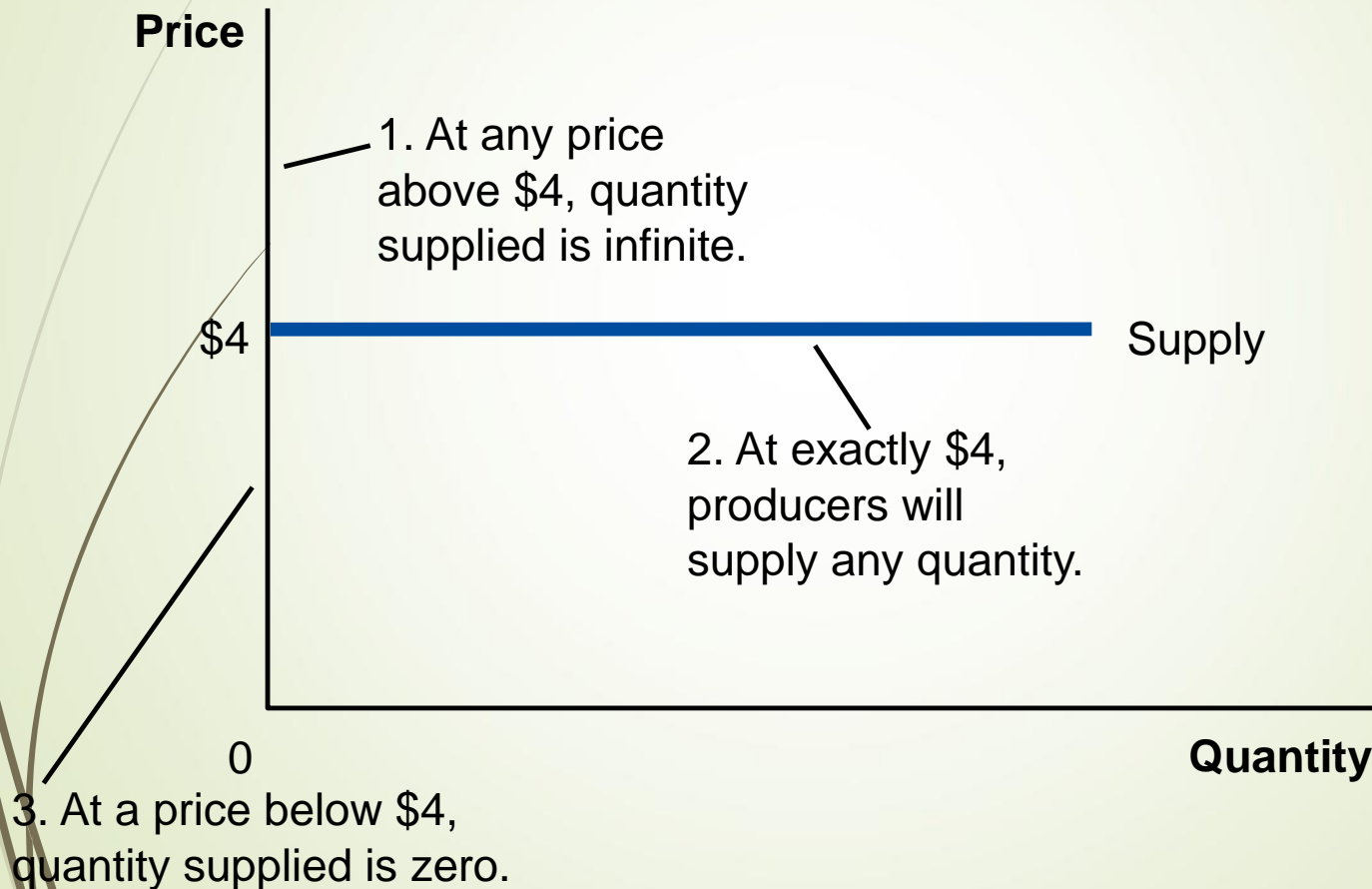
The Price Elasticity of Supply

(d) Elastic Supply: Elasticity Is Greater Than 1



The Price Elasticity of Supply

(e) Perfectly Elastic Supply: Elasticity Equals Infinity



Determinants of Elasticity of Supply

- ▶ Ability of sellers to change the amount of the good they produce.
 - ▶ Beach-front land is inelastic.
 - ▶ Books, cars, or manufactured goods are elastic.
- ▶ Time period.
 - ▶ Supply is more elastic in the long run.

Computing the Price Elasticity of Supply

- ▶ The price elasticity of supply is computed as the percentage change in the quantity supplied divided by the percentage change in price.

$$\text{Price elasticity of supply} = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

Cross elasticity of demand

- The cross-elasticity-of-demand is computed as the percentage change in the quantity demanded of product X divided by the percentage change in the price of product Y.
- If the cross-elasticity coefficient is positive, the two products are substitutes; if negative, they are complements.

Income elasticity

- The income-elasticity is computed as the percentage change in quantity demanded divided by the percentage change in income.
- A positive coefficient indicates a normal or superior good. The coefficient is negative for an inferior good.

Application of Elasticity

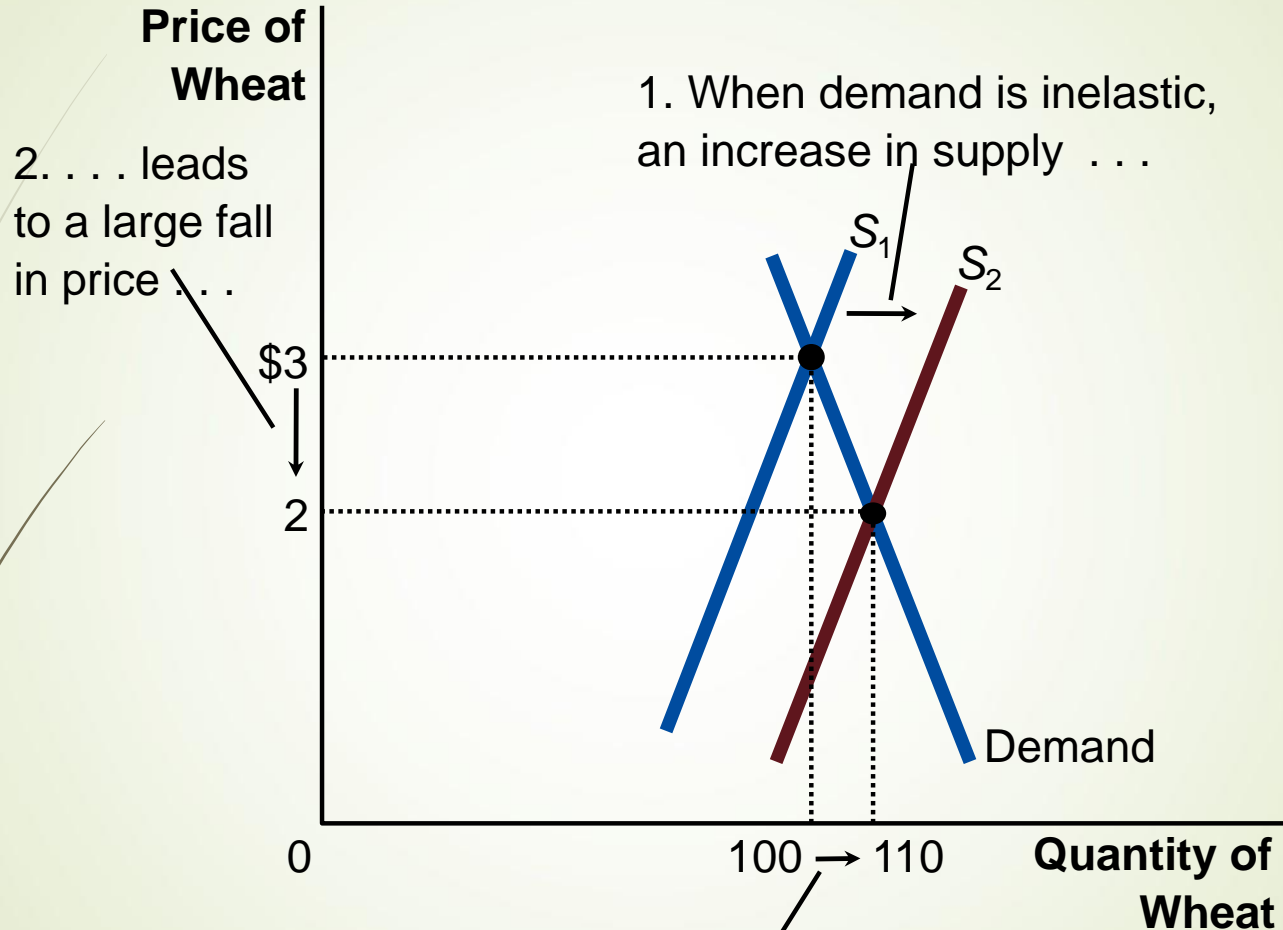
- Can good news for farming be bad news for farmers?
- What happens to wheat farmers and the market for wheat when university agronomists discover a new wheat hybrid that is more productive than existing varieties?



The Application of Supply, Demand, and Elasticity

- Examine whether the supply or demand curve shifts.
- Determine the direction of the shift of the curve.
- Use the supply-and-demand diagram to see how the market equilibrium changes.

An Increase in Supply in the Market for Wheat



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

1. When demand is inelastic, an increase in supply . . .

3. . . . and a proportionately smaller increase in quantity sold. As a result, revenue falls from \$300 to \$220.



Literature:

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