



Demand Elasticity

BECO 3310 Fall 2025

Re 

The Basics

- We talked about how individuals make choices.
 - Marginal Analysis
- We talked about how individuals gain from those choices.
 - Gains from Trade
- We talked about how individuals are able to do this.
 - The Price System and Invisible Hand
- We talked about how individuals can *consistently* do this.
 - Supply, Demand, & Equilibrium



What is elasticity?

Elasticity

- A measure of how responsive one variable is to a change in another variable.
 - Given a change in variable “A,” by how much does variable “B” change?
- A measure of the responsiveness of the quantity demanded or supplied of a good, to a change in one of its determinants.



DEMAND ELASTICITY

3 Types of Demand Elasticity

1. Price Elasticity of Demand
2. Income Elasticity of Demand
3. Cross-Price Elasticity of Demand

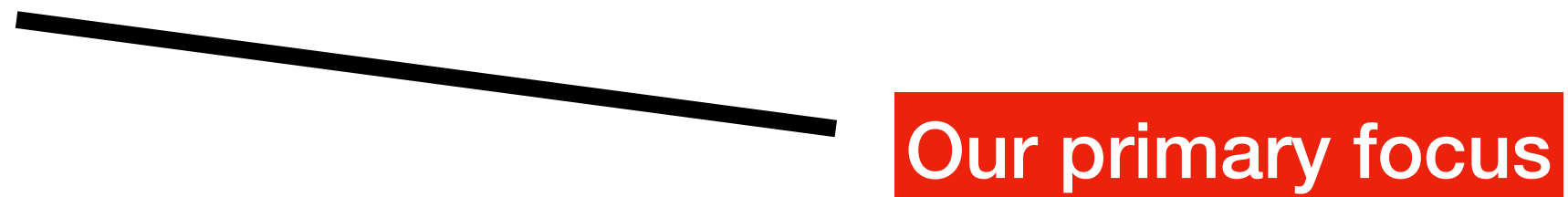

3 Types of Demand Elasticity

1. Price Elasticity of Demand
2. Income Elasticity of Demand
3. Cross-Price Elasticity of Demand



Our primary focus

3 Types of Demand Elasticity

1. Price Elasticity of Demand 
2. Income Elasticity of Demand 
3. Cross-Price Elasticity of Demand

A close-up photograph of two hands pulling apart a ball of multi-colored rubber bands. The bands are stretched, forming a diamond shape. The background is a soft-focus outdoor scene with a blue sky and a body of water. The text 'PRICE ELASTICITY OF DEMAND' is overlaid at the bottom in a black box with white text.

PRICE ELASTICITY OF DEMAND

Price Elasticity of Demand

- A measure of how responsive quantity demanded of a good is to a change in the price of the good itself.
- It is calculated as the percentage change in quantity demanded divided by the percentage change in price.

Price Elasticity of Demand

- Calculating Price Elasticity of Demand:

$$E_d = \frac{\textit{Percentage Change in Quantity Demanded}}{\textit{Percentage Change in Price}}$$

$$E_d = \frac{\% \Delta Q_d}{\% \Delta P}$$

Price Elasticity of Demand

- Percentage Change in Quantity Demanded:

$$\% \Delta Q_d = \frac{Q_{new} - Q_{old}}{Q_{old}} * 100$$

- Percentage Change in Price:

$$\% \Delta P = \frac{P_{new} - P_{old}}{P_{old}} * 100$$

Price Elasticity of Demand

$$E_d = \frac{\% \Delta Q_d}{\% \Delta P}$$

EXAMPLE A:

- Quantity is originally 20 and changes to 25.
- Price is originally 10 and changes to 9.

$$\% \Delta Q_d = \frac{(25 - 20)}{20} * 100$$

$$\% \Delta P = \frac{(9 - 10)}{10} * 100$$

EXAMPLE A:

- Quantity is originally 20 and changes to 25.
- Price is originally 10 and changes to 9.

$$\% \Delta Q_d = \frac{(25 - 20)}{20} * 100 = 25 \%$$

$$\% \Delta P = \frac{(9 - 10)}{10} * 100 = -10 \%$$

EXAMPLE A:

- Quantity is originally 20 and changes to 25.
- Price is originally 10 and changes to 9.

$$E_d = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{25\%}{-10\%}$$

EXAMPLE A:

- Quantity is originally 20 and changes to 25.
- Price is originally 10 and changes to 9.

$$E_d = \frac{\% \Delta Q_d}{\% \Delta P} = \frac{25\%}{-10\%} = -2.5\%$$

EXAMPLE A:

- What does that -2.5% mean?
- If the price decreases by 1%, the quantity demanded will increase by 2.5%.
- Likewise, if the price increases by 1%, the quantity demanded will decrease by 2.5%

Price Elasticity of Demand

- **Midpoint Formula**

- Another way to calculate price elasticity of demand.
- This offers the benefit of calculating from the same base.
- We get the same elasticity for both directions (increase or decrease in price) without having to switch the numbers in the equation.

$$E_d = \frac{(Q_2 - Q_1) / [(Q_2 + Q_1) / 2]}{(P_2 - P_1) / [(P_2 + P_1) / 2]}$$

EXAMPLE A: Midpoint Method

- Quantity is originally 20 and changes to 25.
- Price is originally 10 and changes to 9.

$$E_d = \frac{(25 - 20)/[(25 + 20)/2]}{(9 - 10)/[(9 + 10)/2]} = \frac{(5)/(22.5)}{(-1)/9.5} = \frac{0.22}{-0.11} \approx -2.5$$

Price Elasticity of Demand

- Why is the elasticity negative (-2.5) ?
 - Diminishing marginal utility!
 - Price is negatively related to quantity demanded.
 - The higher the price, the less I want, and vice-versa.
- Elasticities of Demand are always negative.
 - Because of this, we take the absolute value of the result to help us interpret the nature of the good's demand.

Elastic, Inelastic, & Unit-Elastic Demand

Elastic, Inelastic, & Unit-Elastic Demand

- $|E_d| > 1$: Elastic Demand
- $|E_d| < 1$: Inelastic Demand
- $|E_d| = 1$: Unit-Elastic Demand

Elastic Demand

- $|E_d| > 1$
 - The quantity demanded is relatively more responsive to a change in price.
 - A 1% change in price will lead to a greater than 1% change in quantity demanded.
- $|E_d| > \infty$
 - Perfectly Elastic Demand
 - At price “P”, consumers will demand any quantity.
 - If the price increases above “P”, quantity demanded goes to zero.
 - If the price decreases below “P”, infinite quantity is demanded.

Inelastic Demand

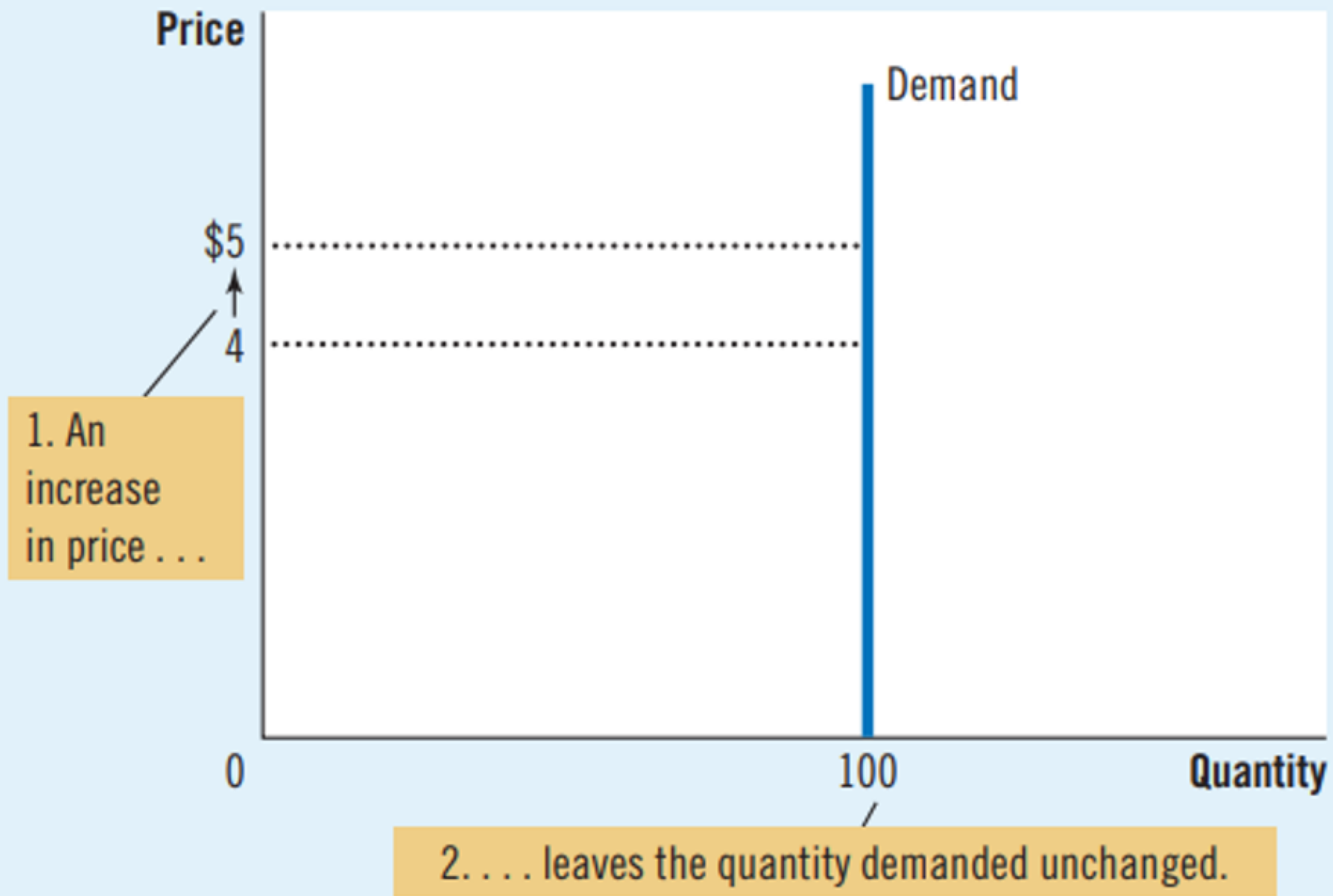
- $|E_d| < 1$
 - The quantity demanded is relatively less responsive to a change in price.
 - A 1% change in price will lead to a less than 1% change in quantity demanded.
- $|E_d| = 0$
 - Perfectly Inelastic Demand
 - The quantity demanded will never change following a change in price.

Unit-Elastic Demand

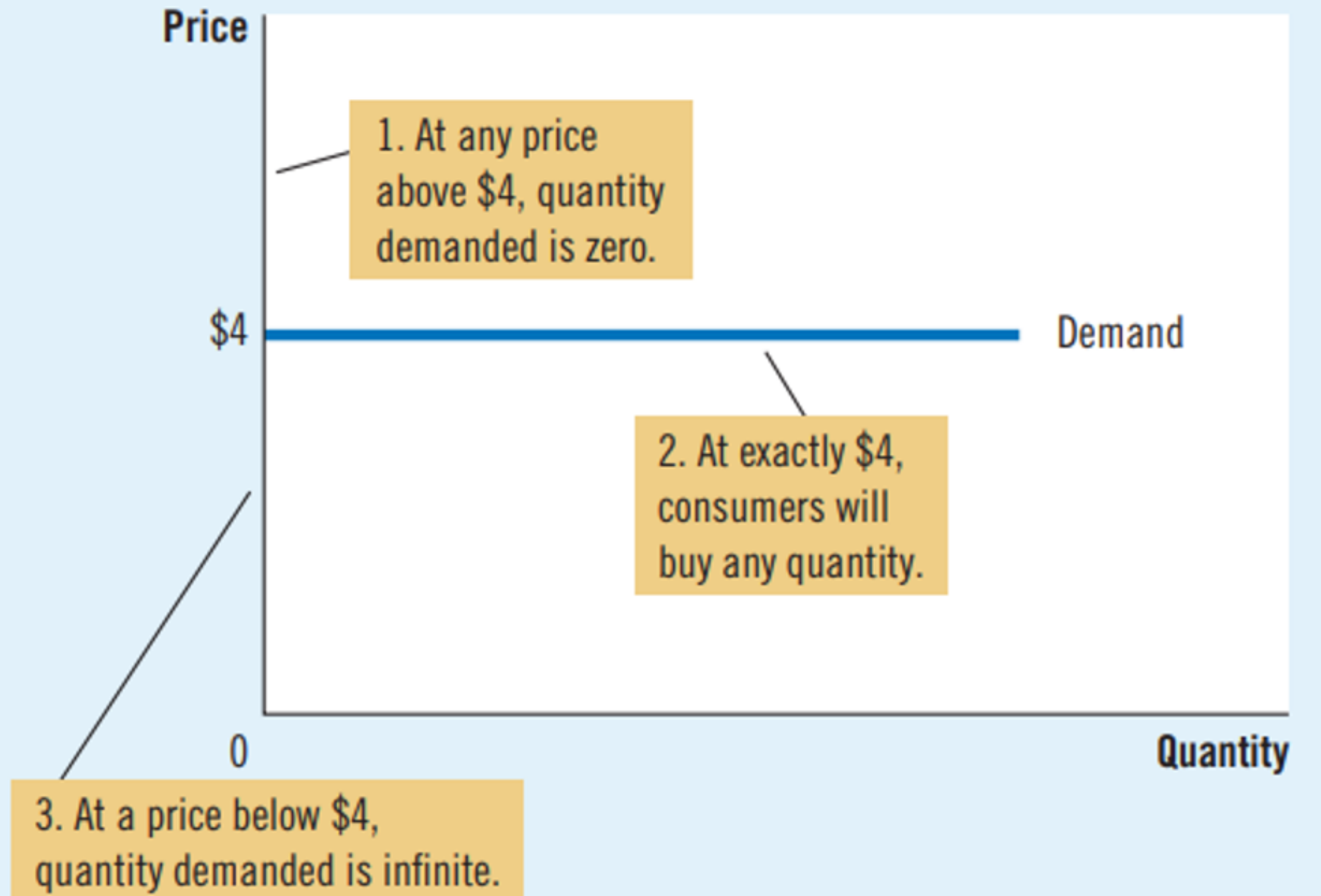
- $|E_d| = 1$
 - The quantity demanded is equally responsive to a change in price.
 - A 1% change in price will lead to a 1% change in quantity demanded

Extreme cases

(a) Perfectly Inelastic Demand: Elasticity Equals 0

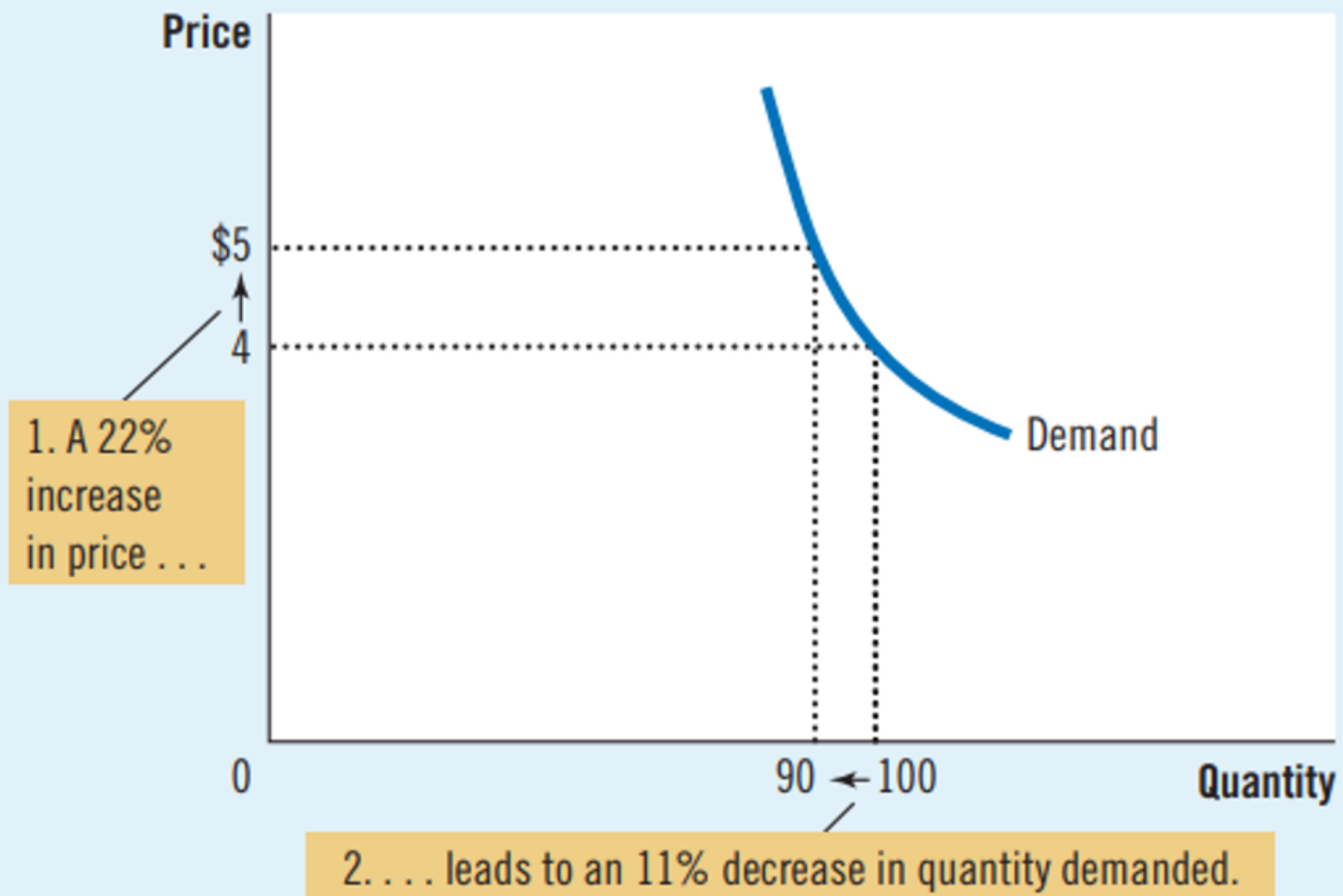


(e) Perfectly Elastic Demand: Elasticity Equals Infinity

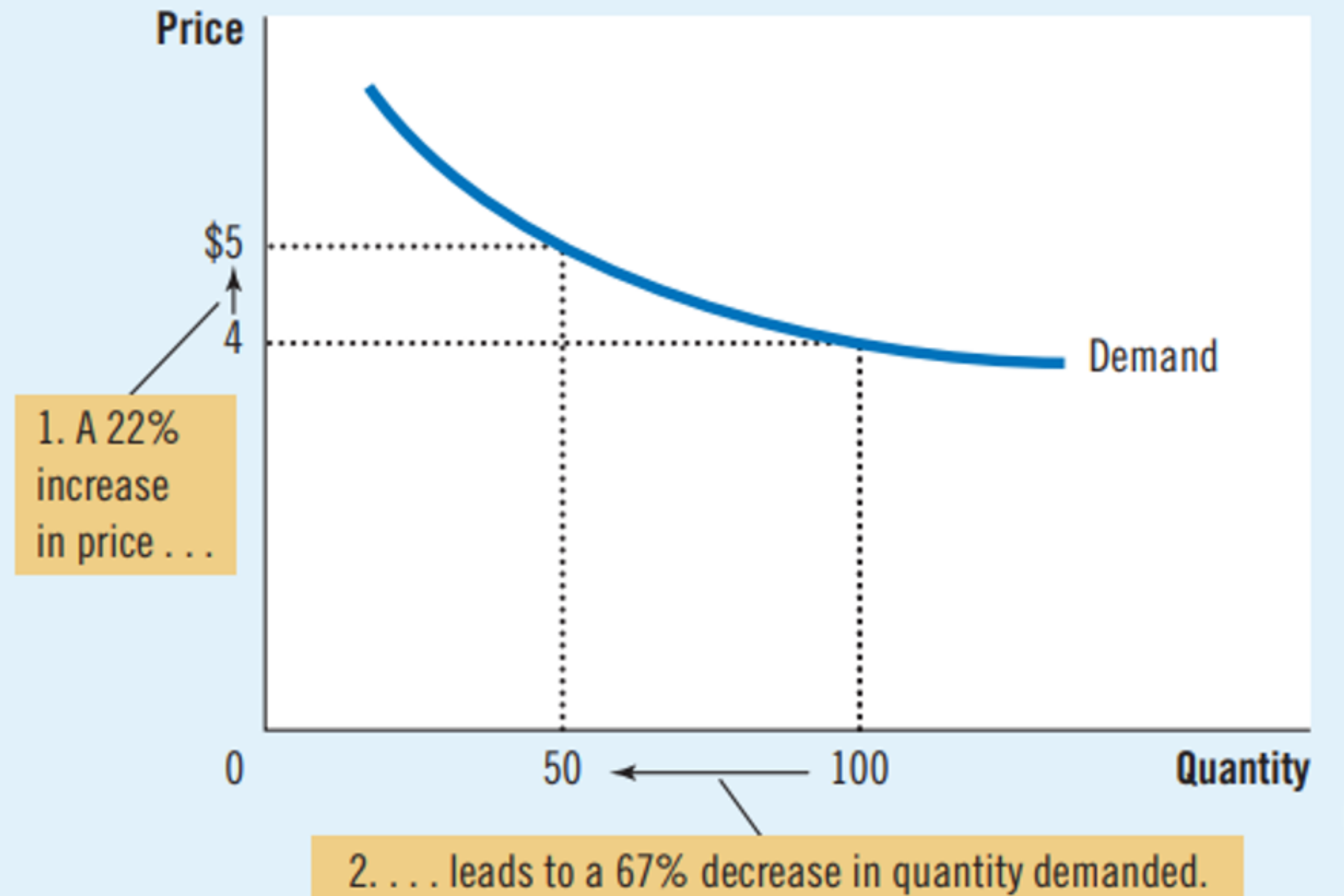


Typical Cases

(b) Inelastic Demand: Elasticity Is Less Than 1

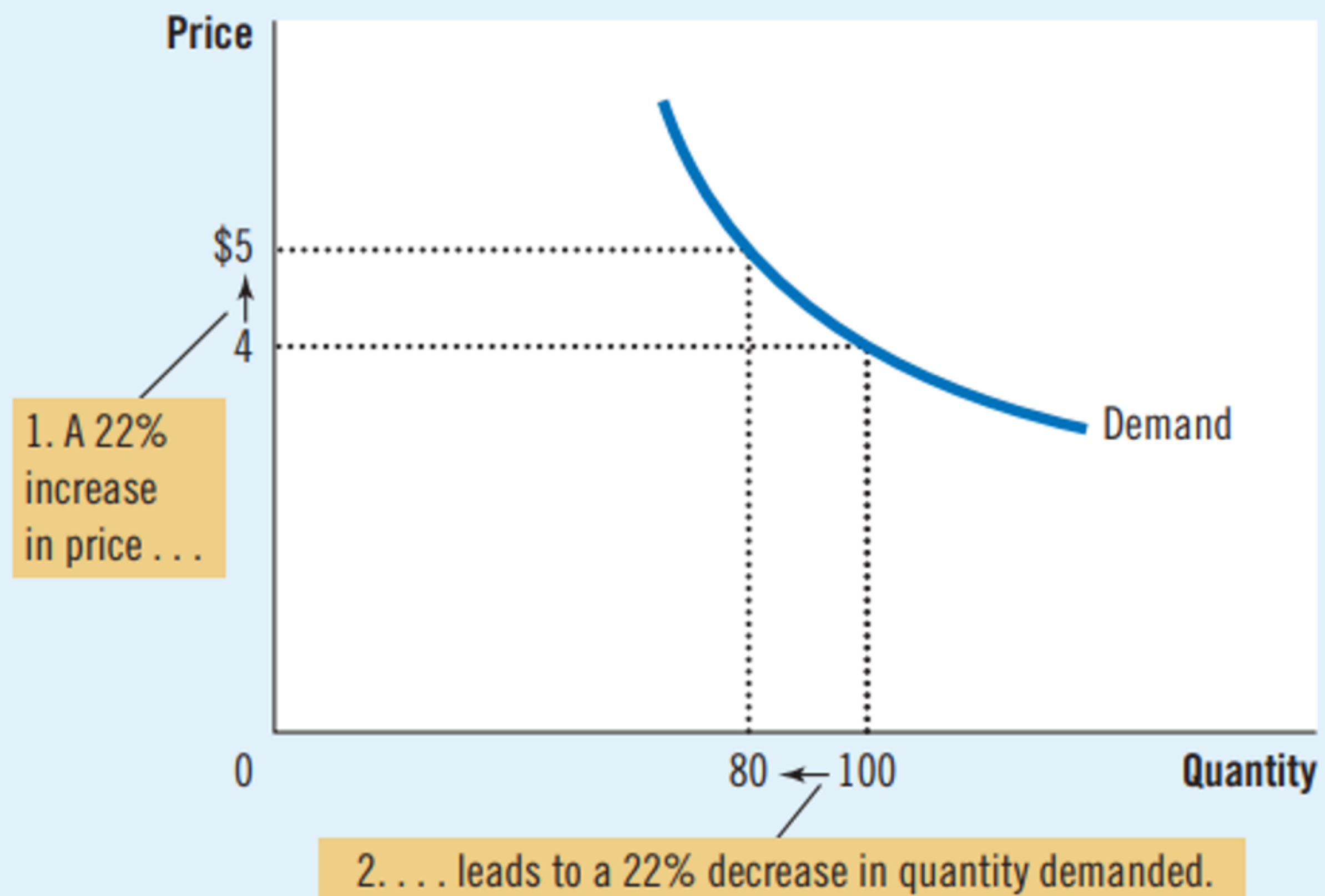


(d) Elastic Demand: Elasticity Is Greater Than 1



Less-Typical Case

(c) Unit Elastic Demand: Elasticity Equals 1



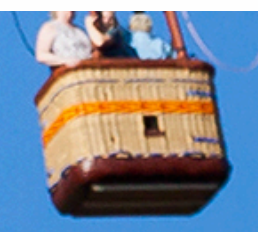
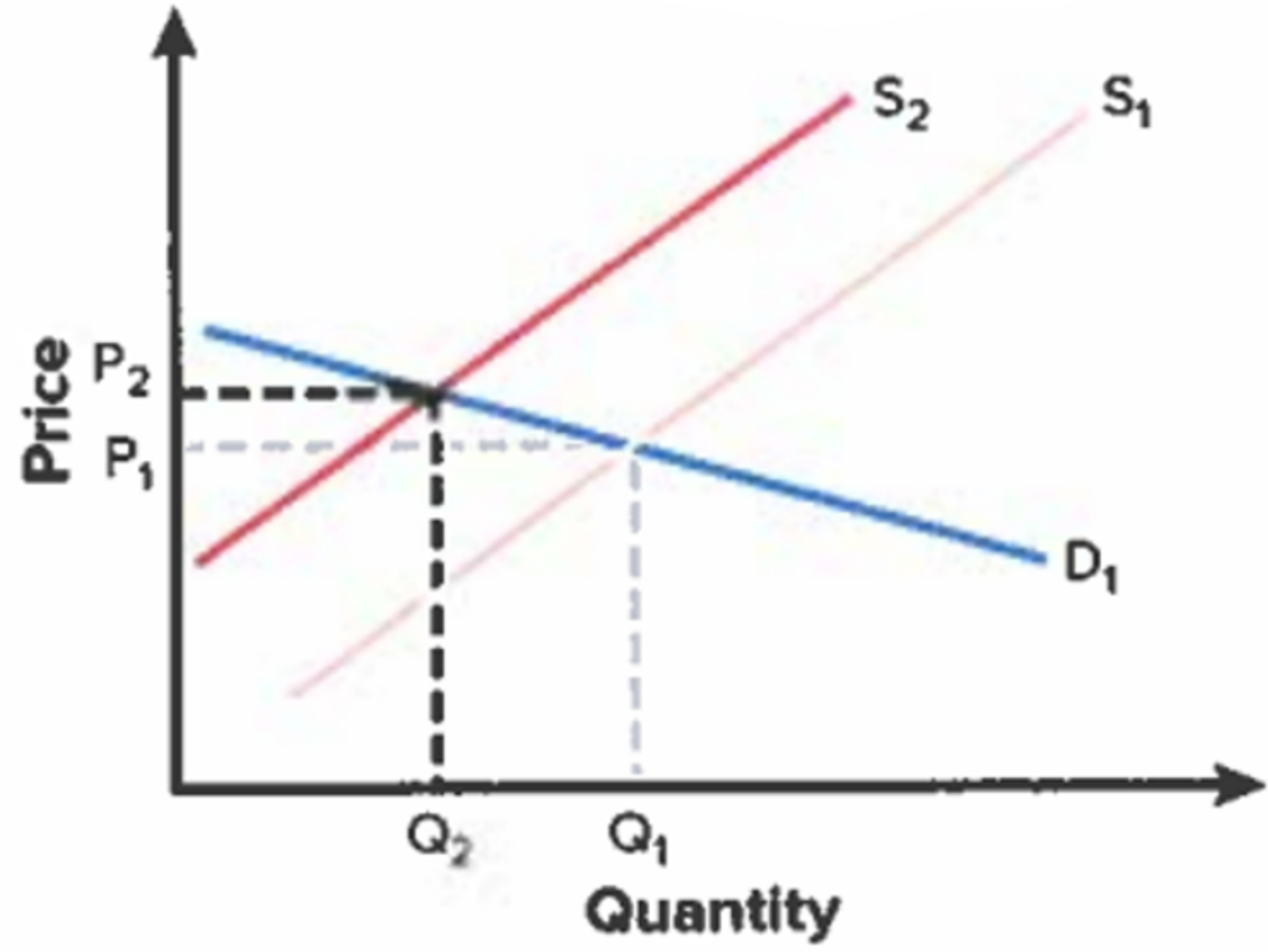
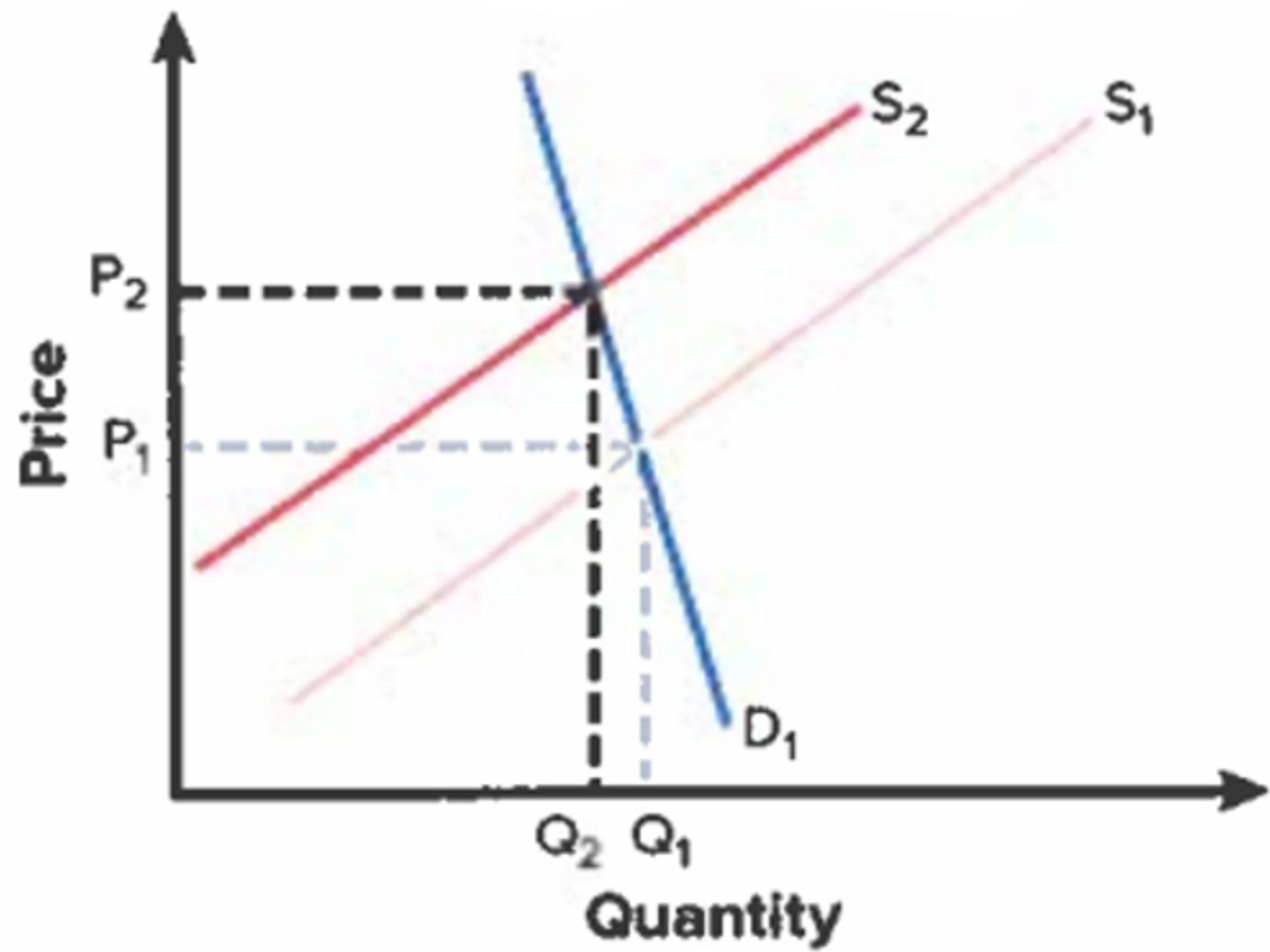
Determinants of elasticity

Determinants of Elasticity

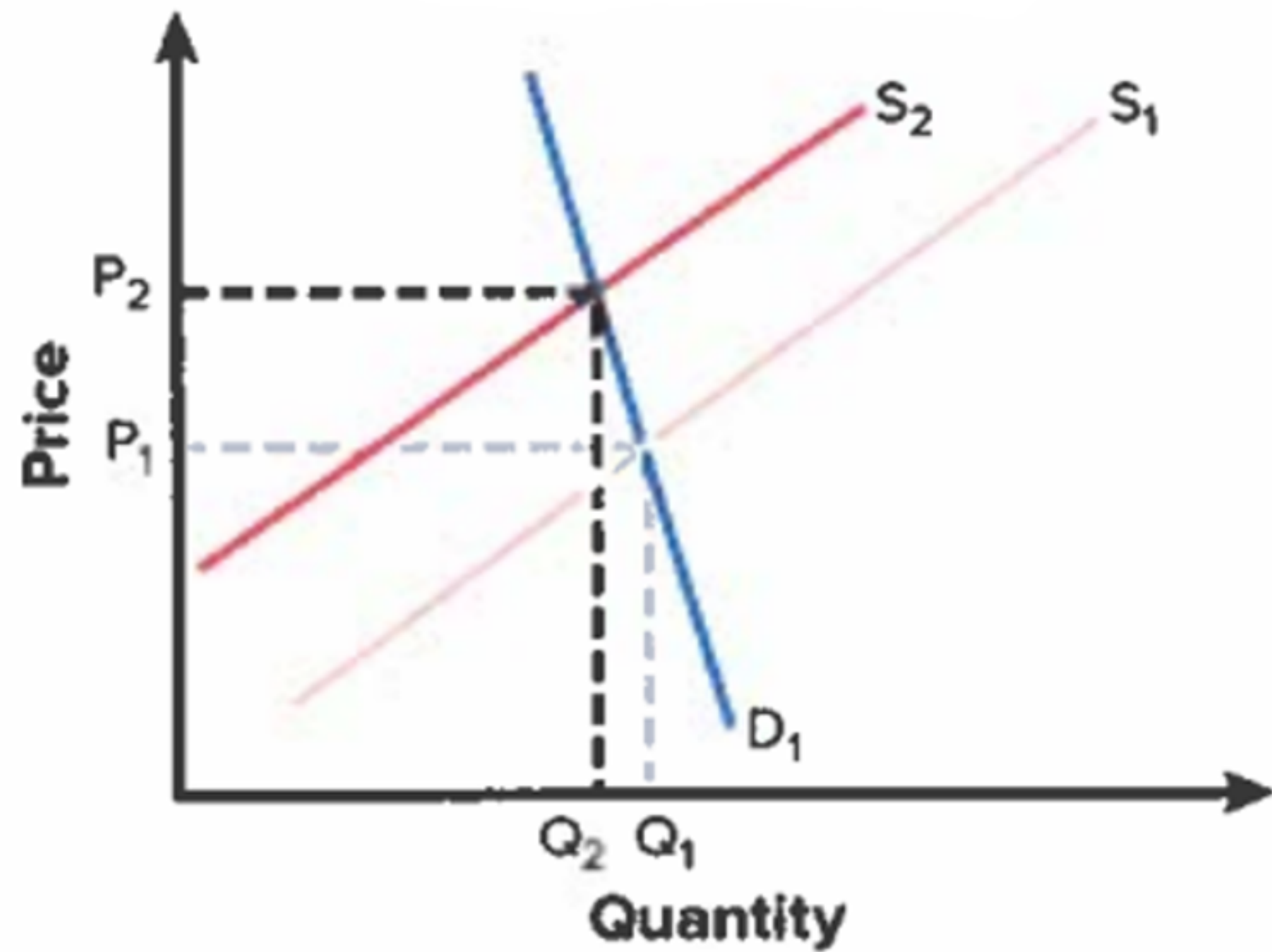
- Substitutes
- Necessity vs. Luxury Goods
- Definition of the Market
- Time Horizon

Substitutes & Elasticity

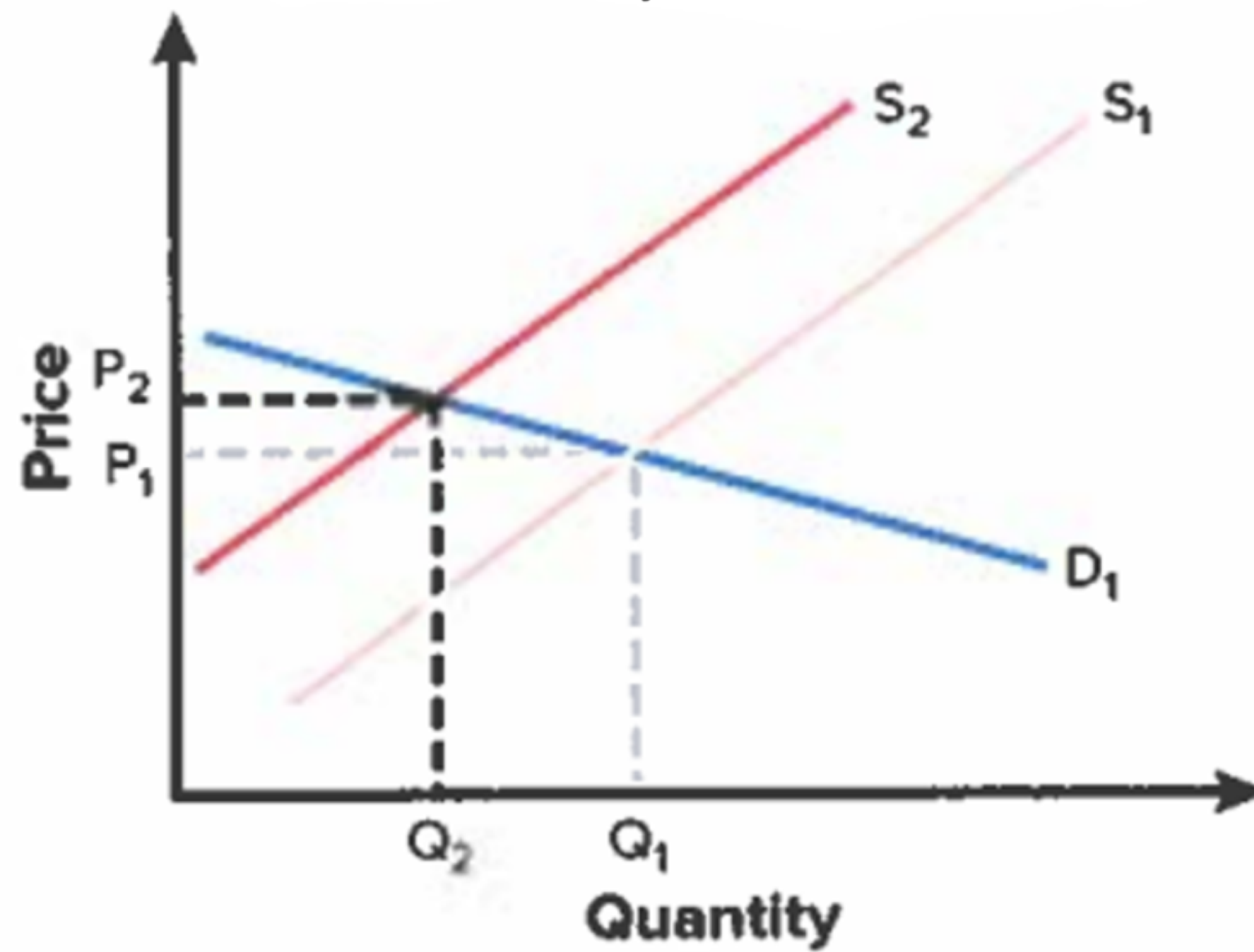
- A good with more available substitutes is relatively more elastic.
 - It's easier for consumers to switch from one good to another.
 - **Ex: Butter & Margarine**
 - The demand for butter is relatively elastic because people can just switch to margarine if the price of butter increases, all else equal.



Few Substitutes

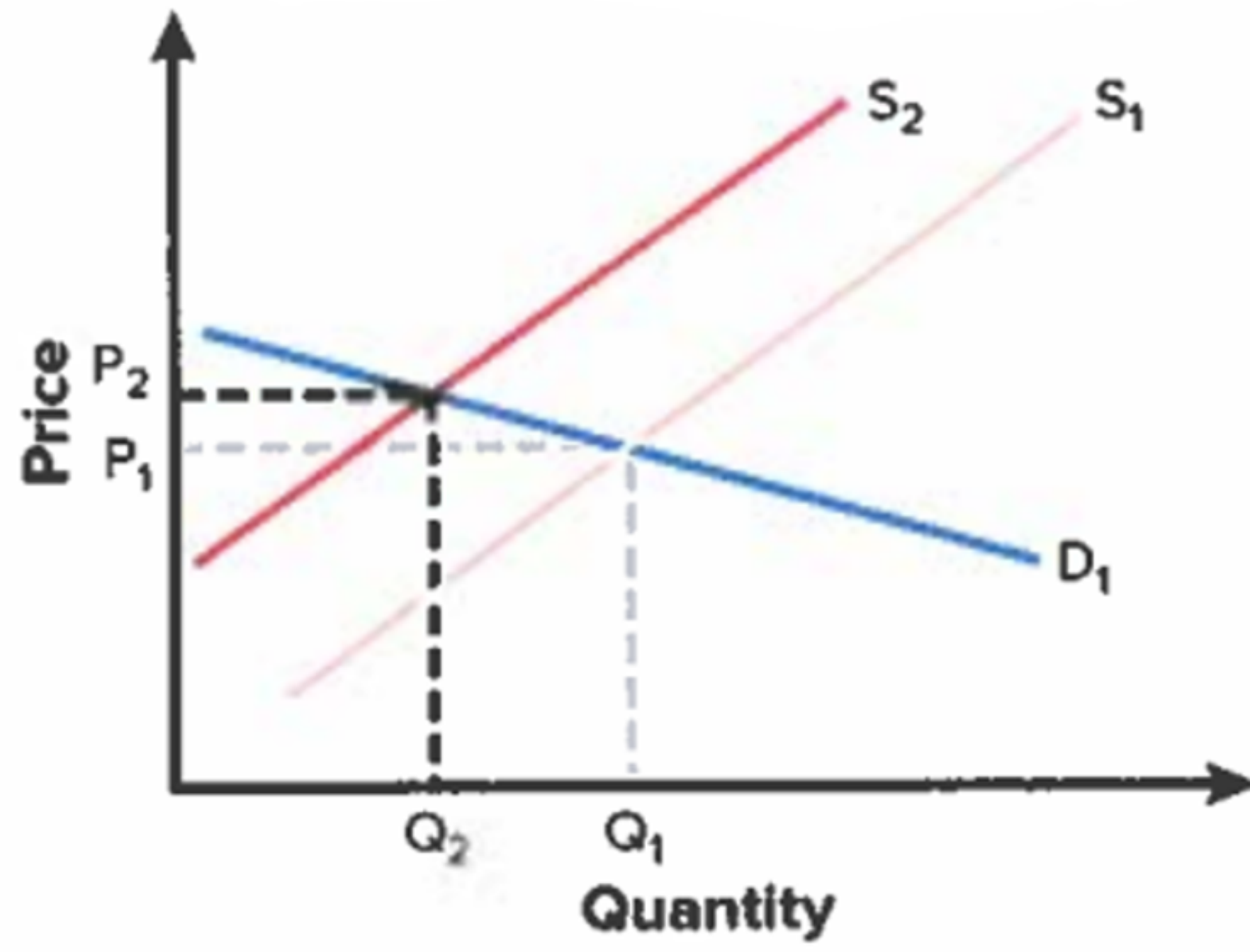
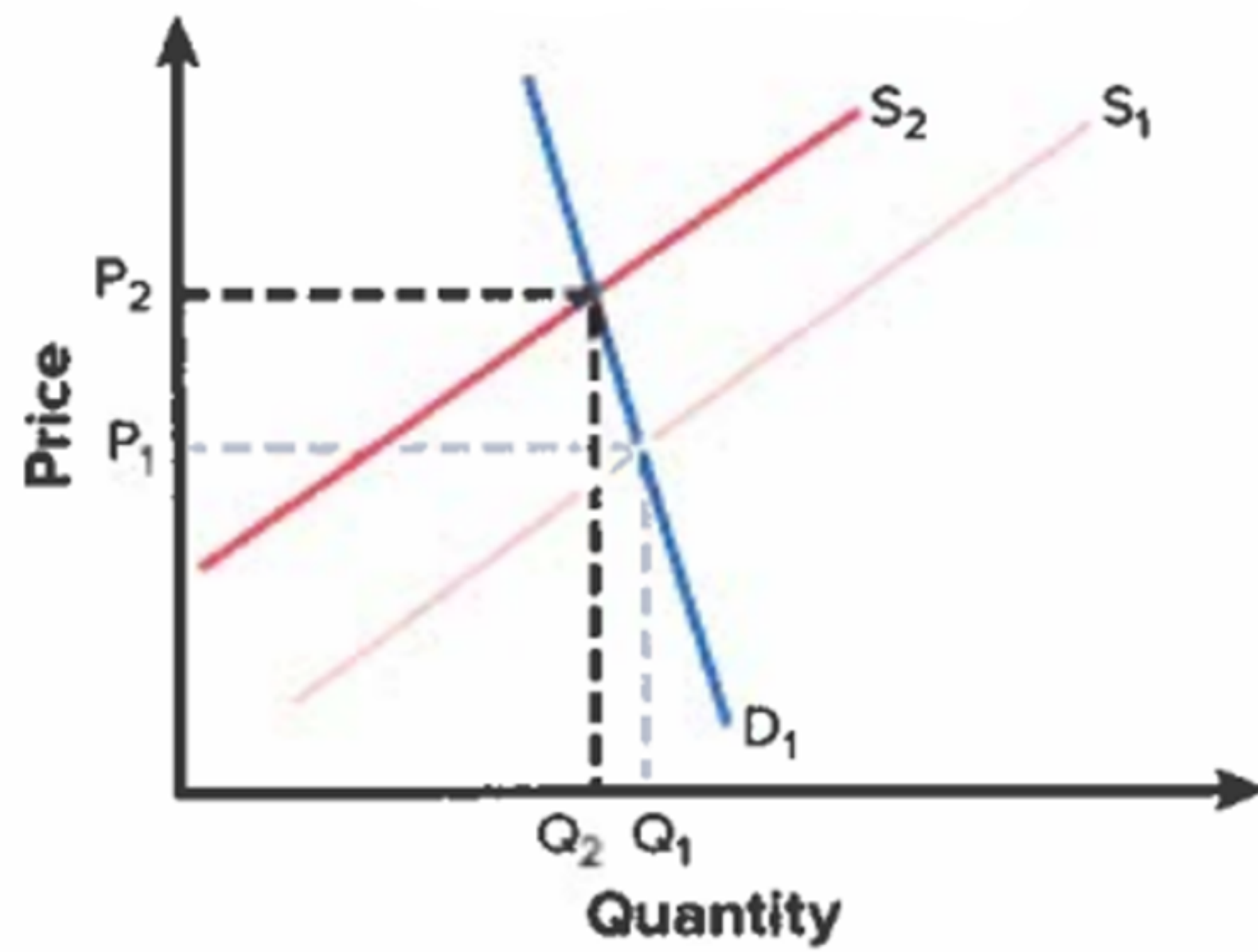


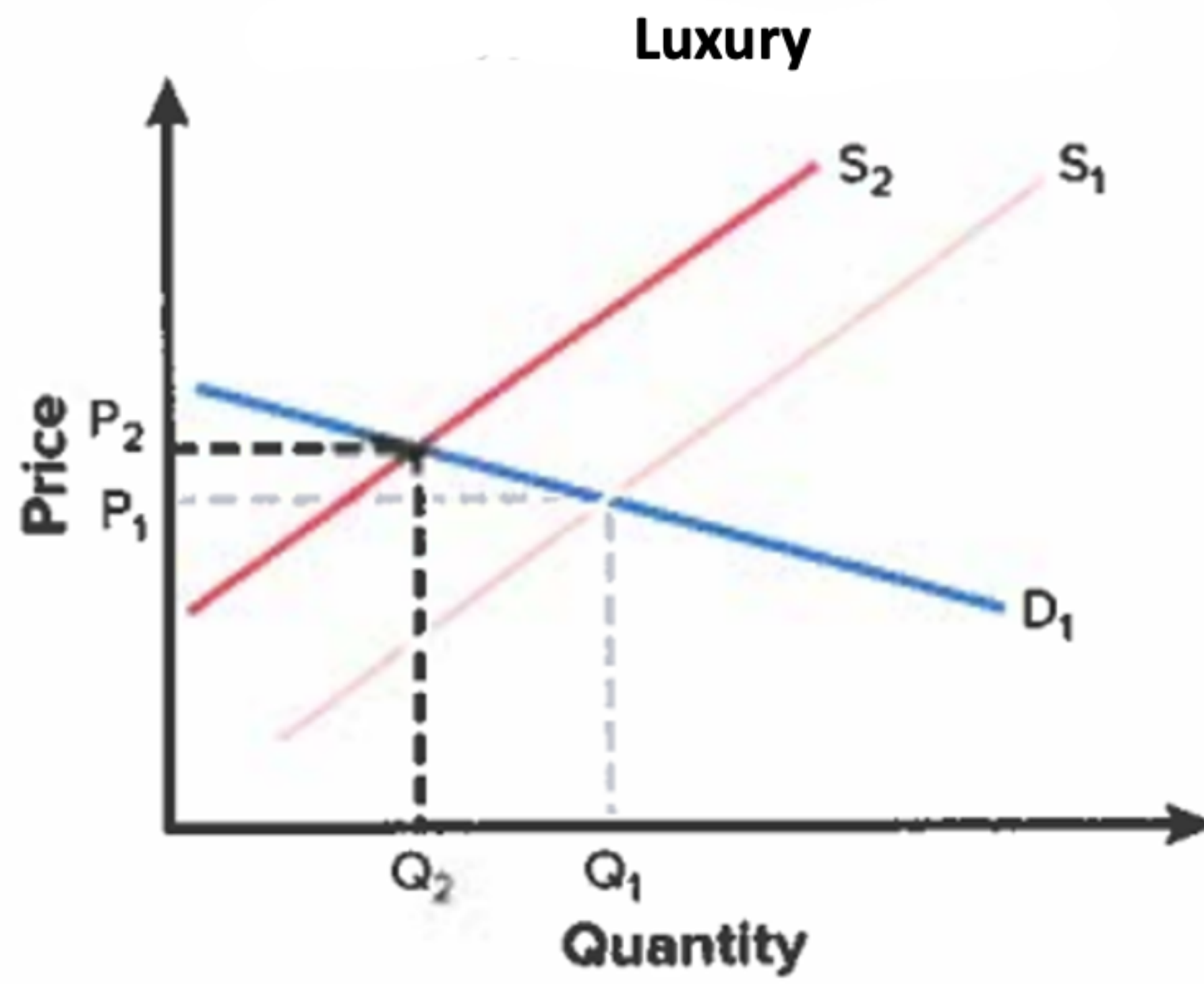
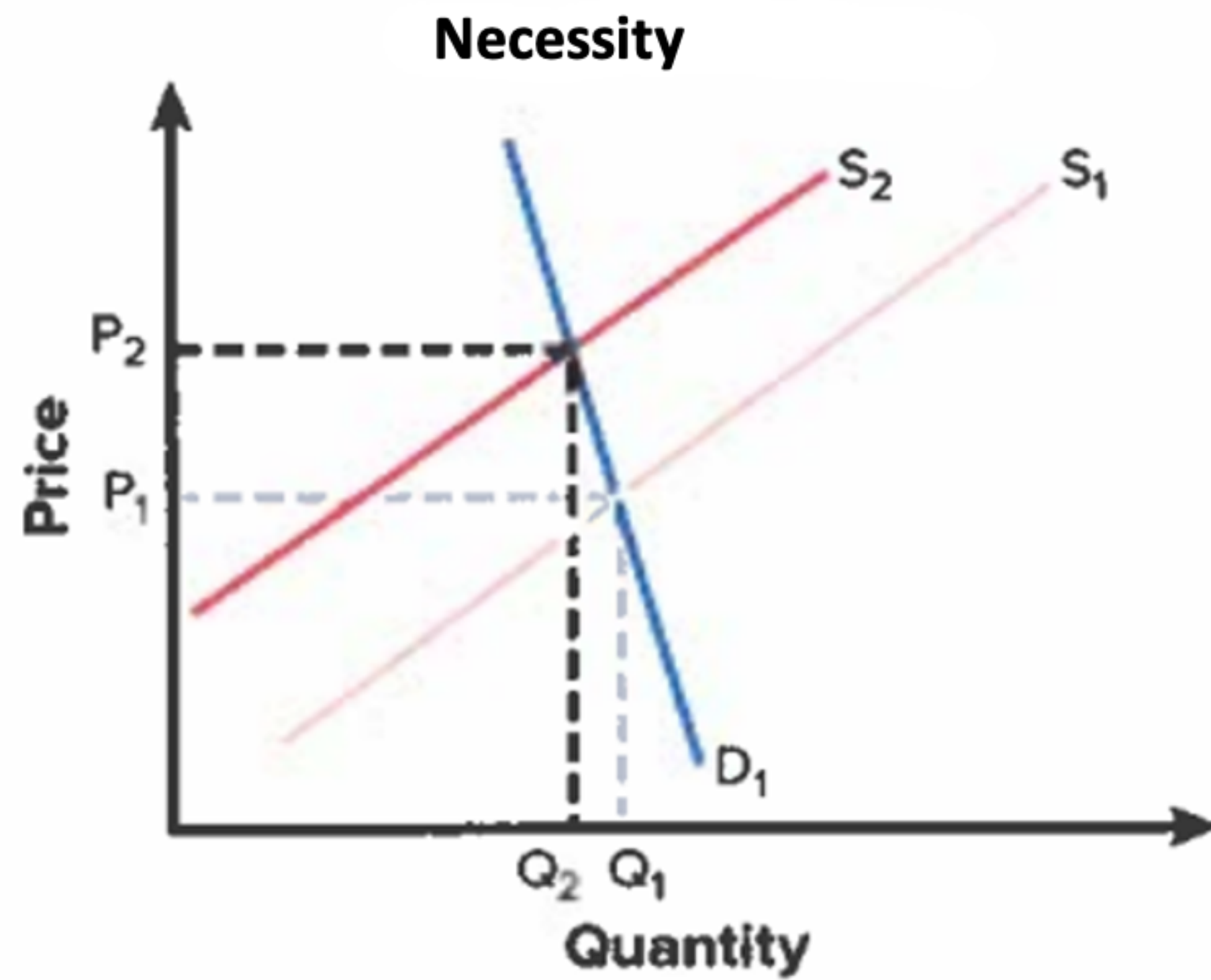
Many Substitutes



Necessities, Luxuries, & Elasticity

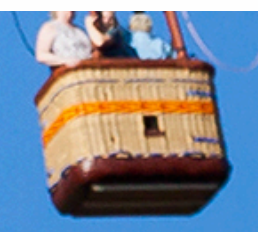
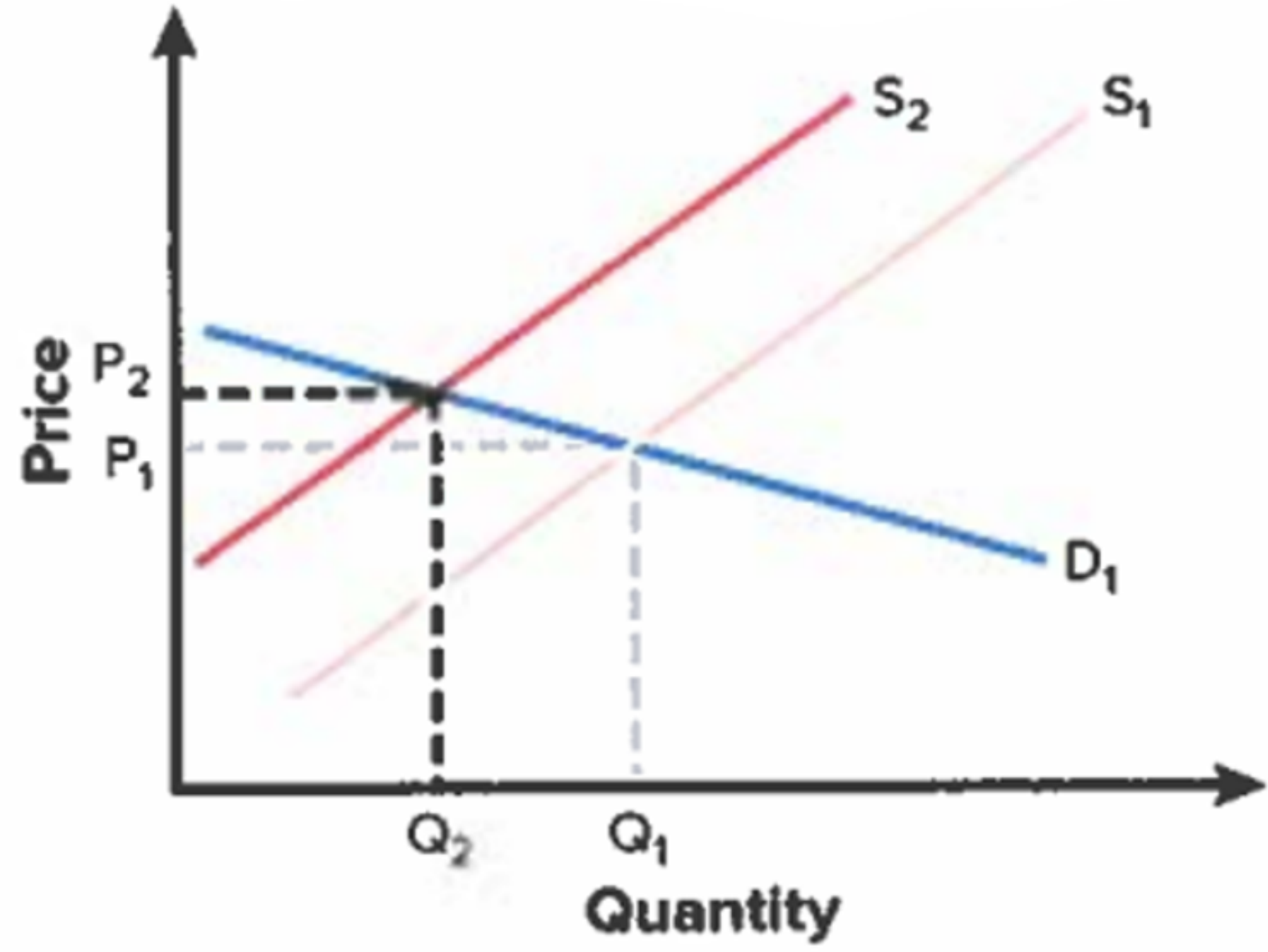
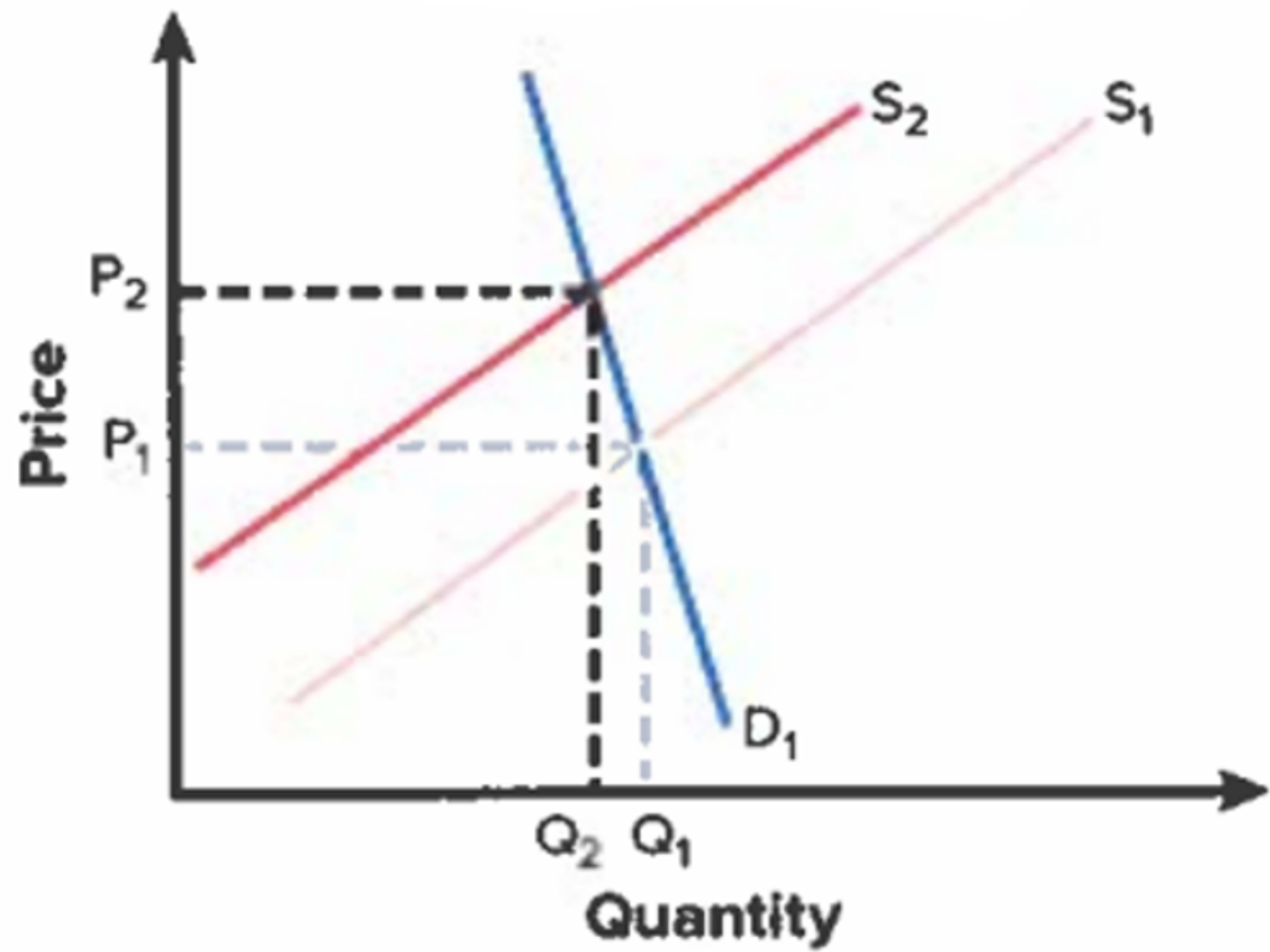
- **Necessities** tend to have relatively inelastic demands, whereas luxuries have more elastic demands.
 - Ex: Doctors vs. Sailboats
 - If the price of doctor's visits rise, people will still go to the doctor, though perhaps not as often on the margin.
 - If the price of sailboats rise, the quantity demanded will likely fall a lot.



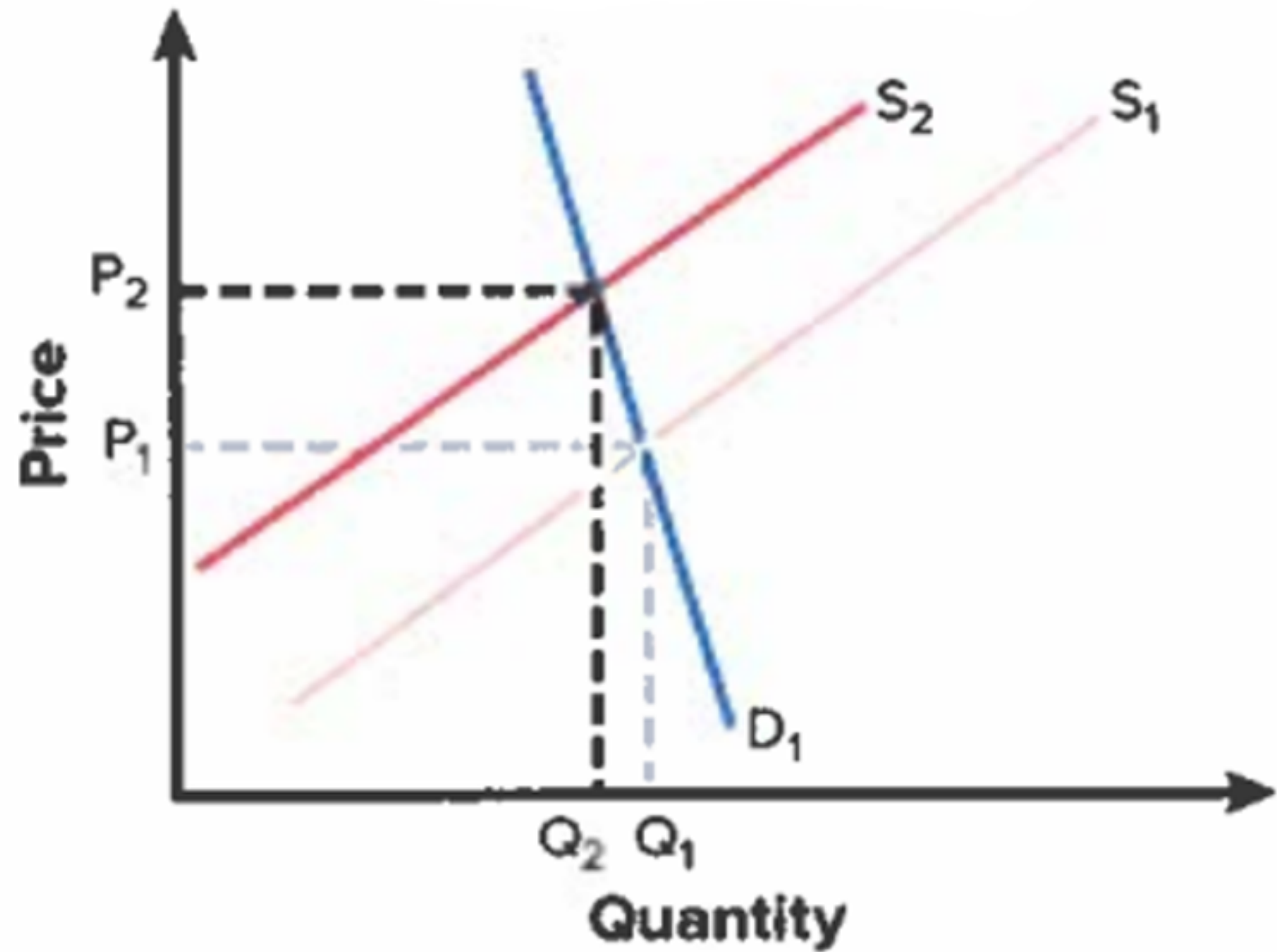


Definition of the Market & Elasticity

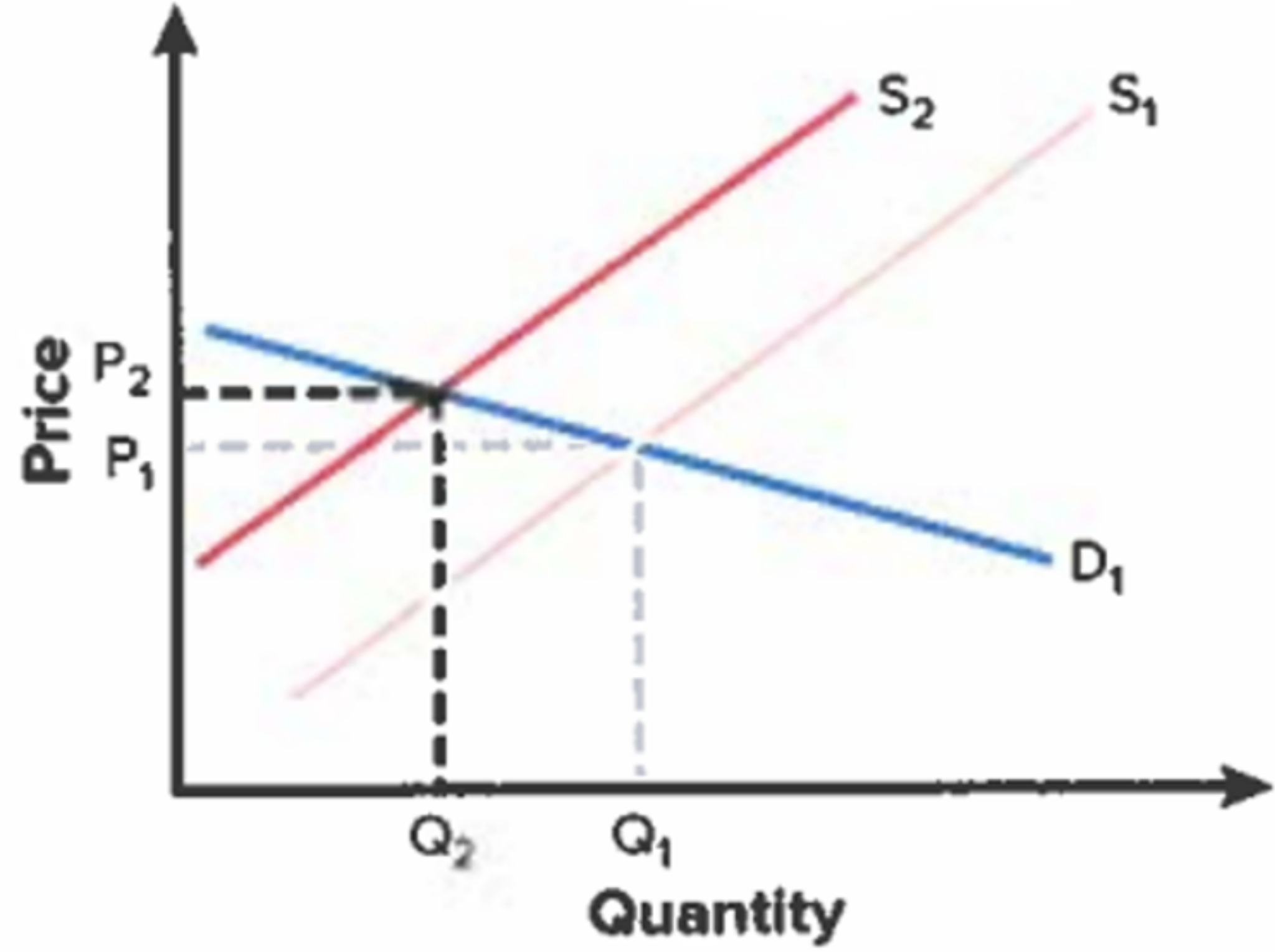
- Narrowly defined markets have relatively elastic demands compared to broadly defined markets.
 - Ex: Food vs. Ice Cream
 - Food is a broad market. There's no real substitute for "food." Demand is inelastic.
 - Ice cream is a narrow market. It's easier to substitute other desserts for ice cream.



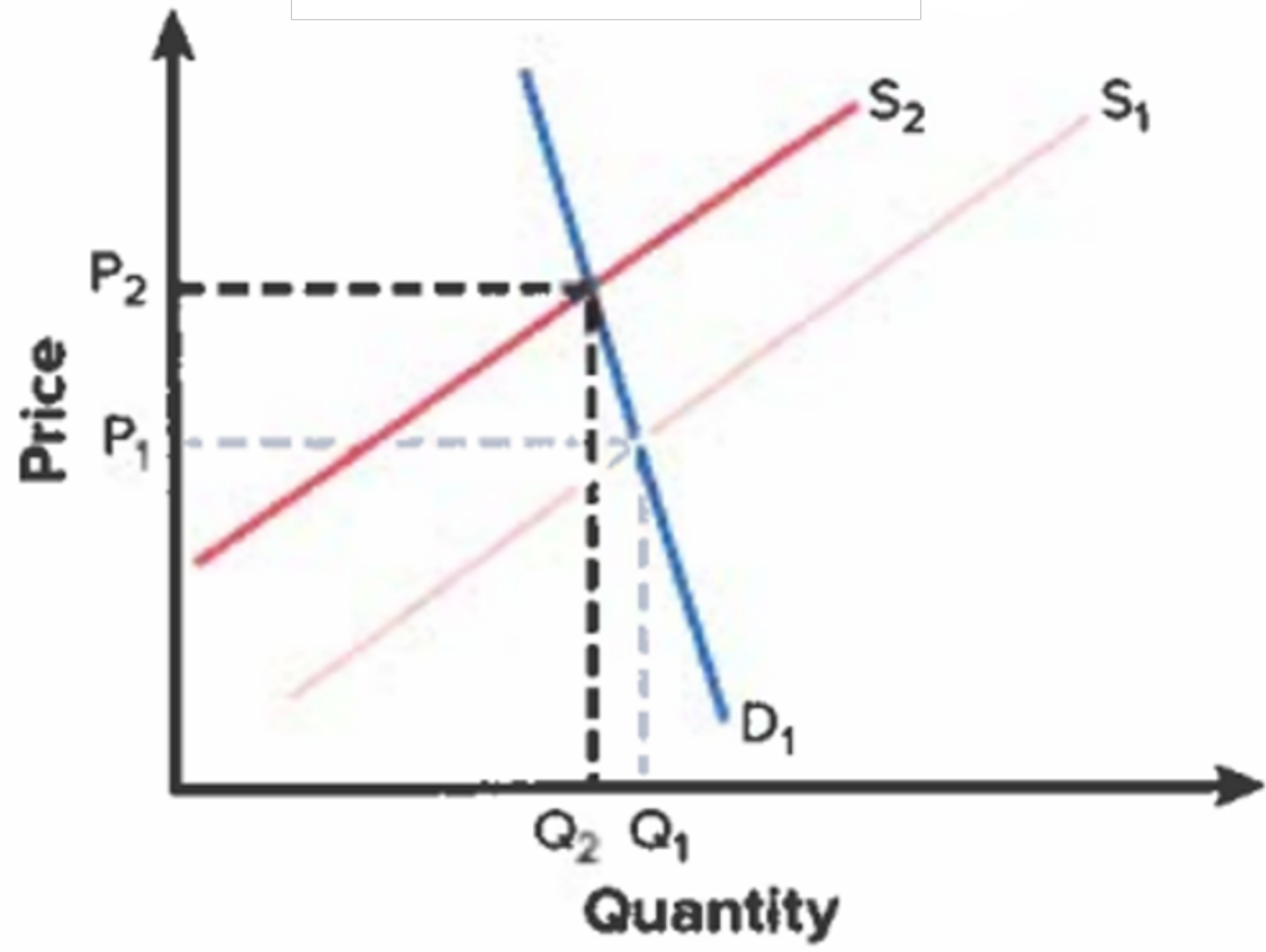
Broad Market



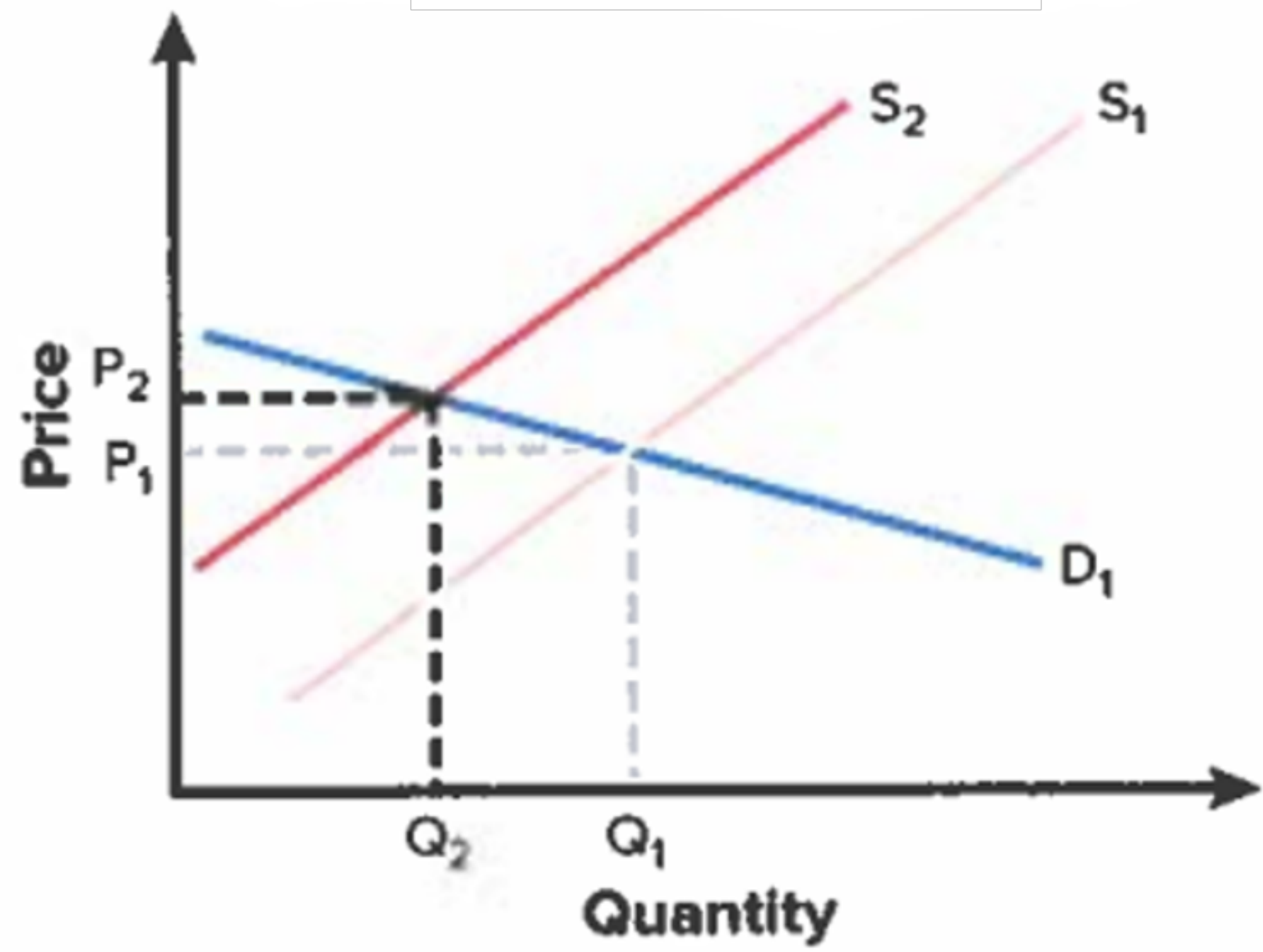
Narrow Market



Gasoline in the Short Run



Gasoline in the Long Run



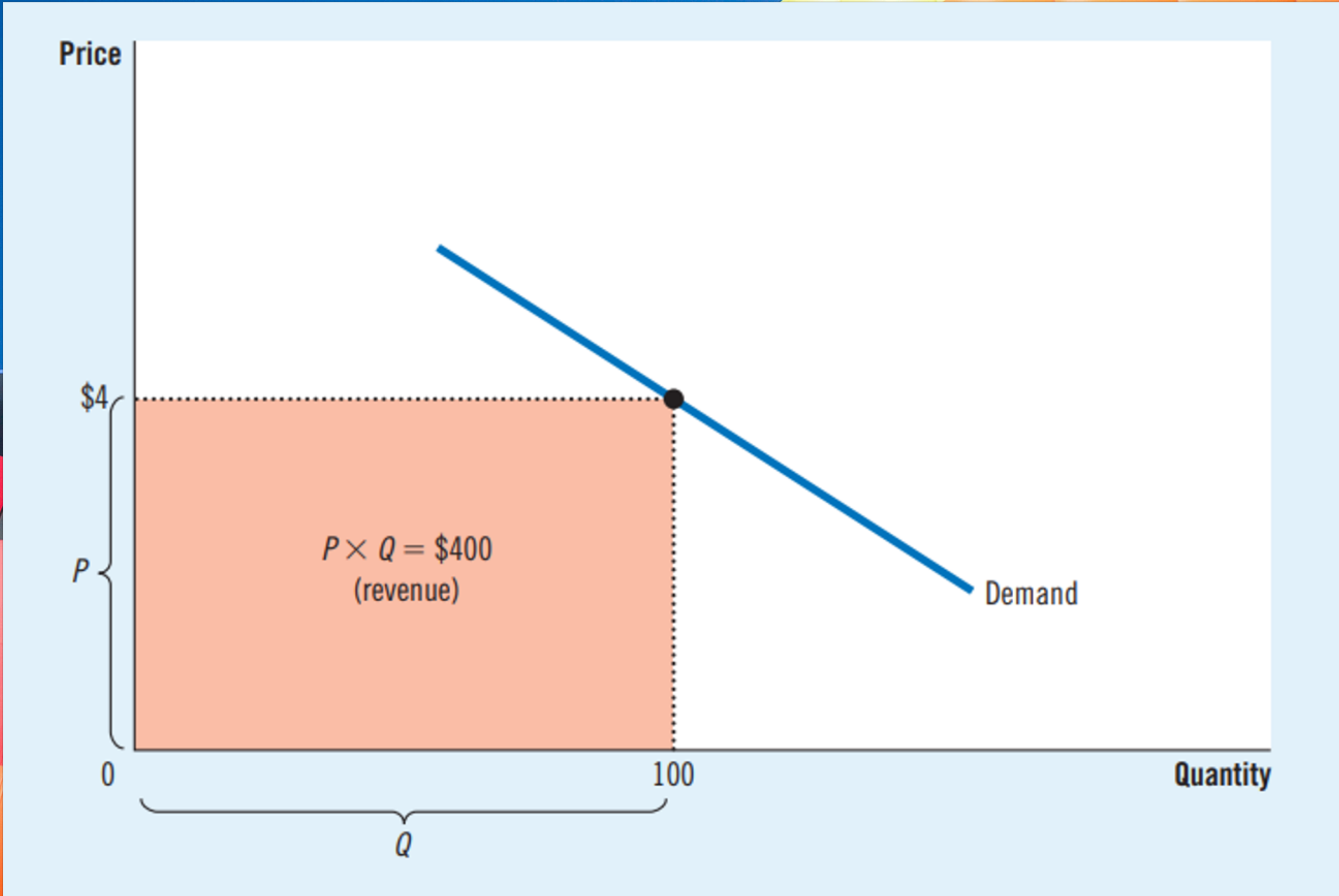
Total Revenue & Elasticity

Total Revenue & Elasticity of Demand

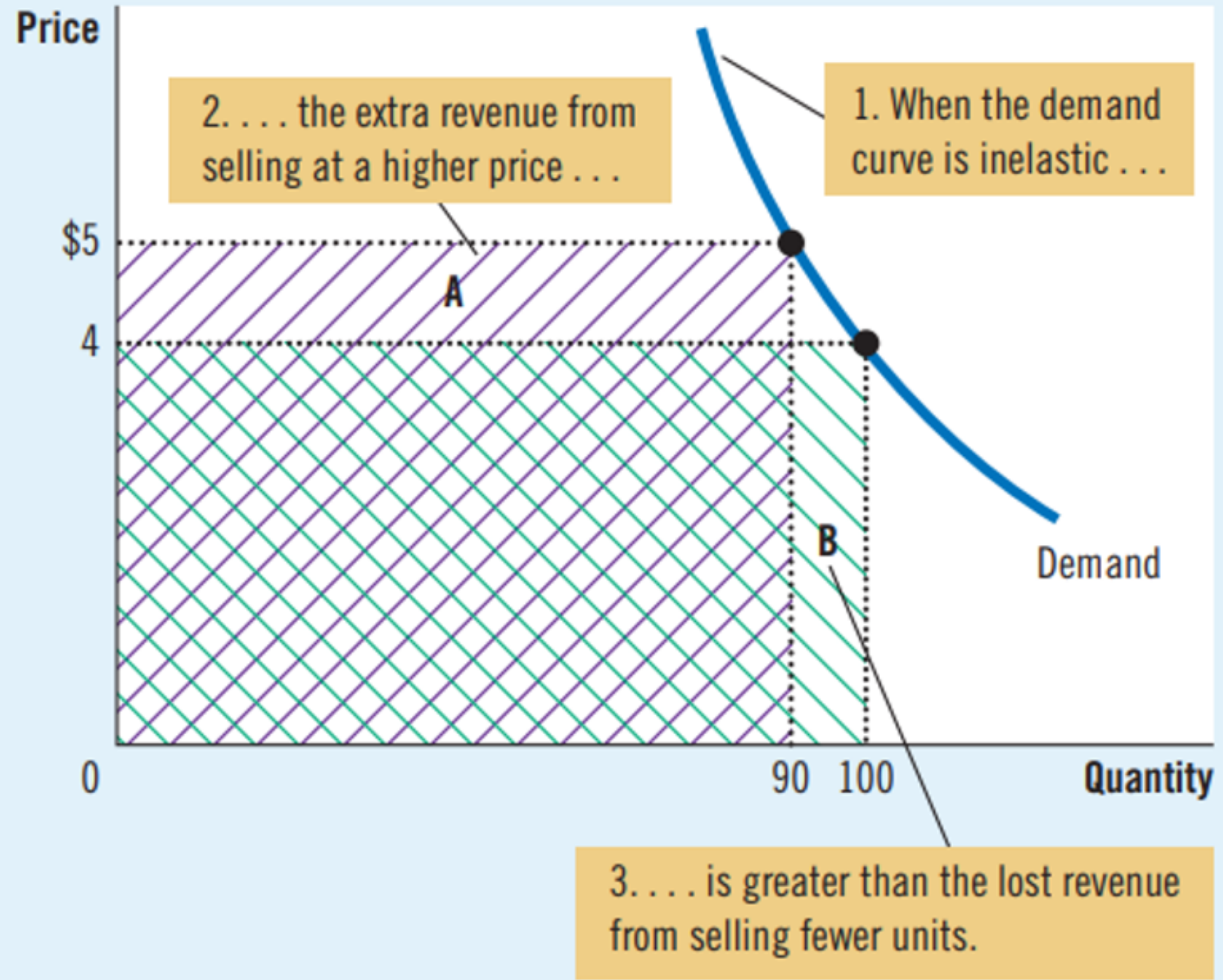
- Total Revenue
- The total amount paid by buyers & received by sellers for a good.

$$TR = P * Q$$

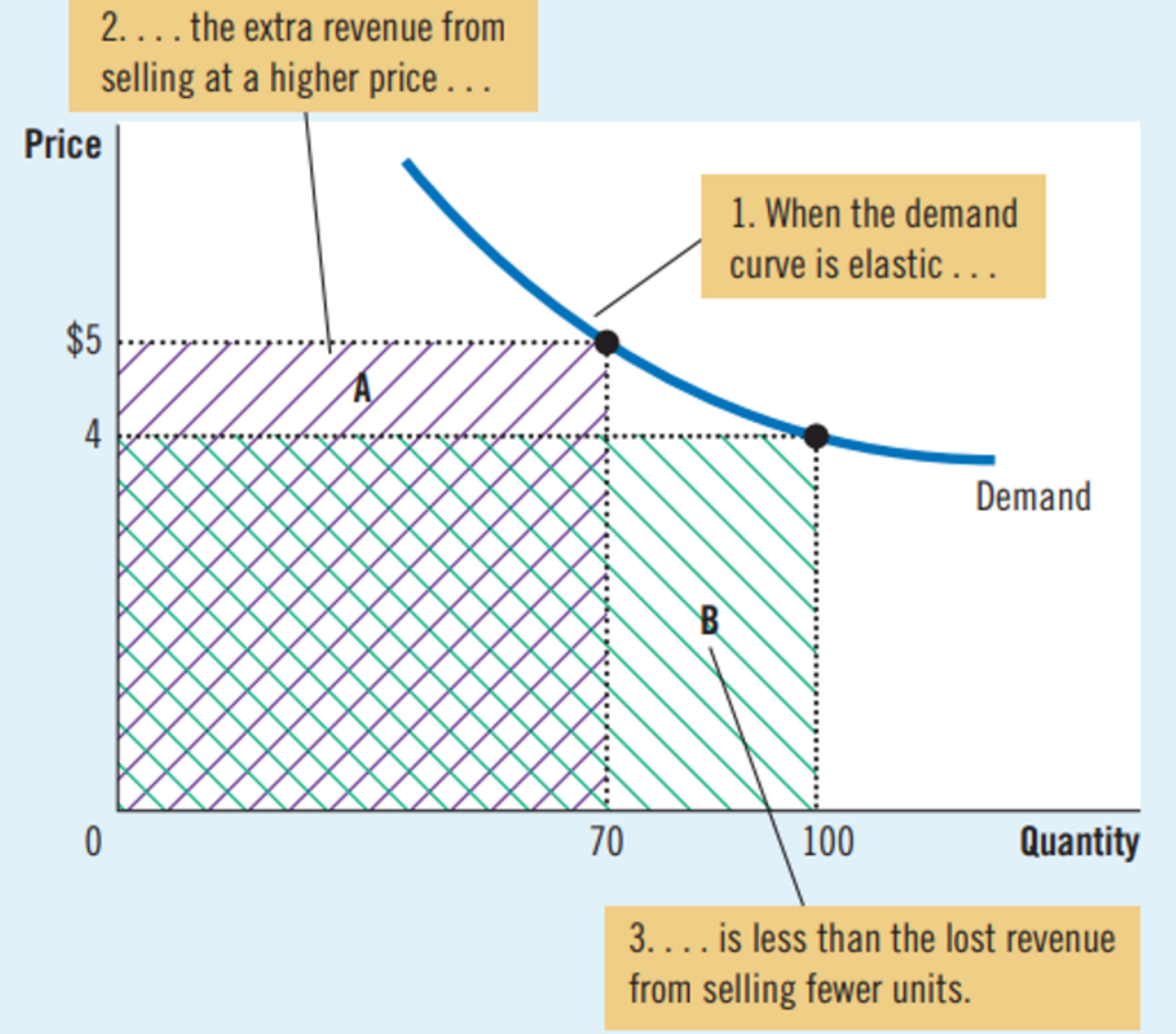
- If price increases & total revenue decreases...
 - Demand is relatively elastic.
- If price increase & total revenue increases...
 - Demand is relatively inelastic.



(a) The Case of Inelastic Demand



(b) The Case of Elastic Demand



Total Revenue & Elasticity of Demand

- If, $\uparrow TR \uparrow P$, demand is inelastic.
- If, $\downarrow TR \downarrow P$, demand is inelastic.
- If, $\uparrow TR \downarrow P$, demand is elastic.
- If, $\downarrow TR \uparrow P$, demand is elastic.



INCOME ELASTICITY OF DEMAND

Income Elasticity of Demand

- How much the quantity demanded of a good responds to a change in consumers' income.

$$E_I = \frac{\% \Delta Q_d}{\% \Delta I}$$

Income Elasticity of Demand

- Normal Goods
 - Positive income elasticities.
 - If your income rises, your quantity demanded for a normal good increases.
- Inferior Goods
 - Negative income elasticities.
 - If your income rises, your quantity demanded for an inferior good decreases.

Income Elasticity of Demand

- Necessities
 - Smaller income elasticities.
 - If you win the lottery, your income increases, but you probably won't buy much more necessities than before.
- Luxuries
 - Larger income elasticities.
 - If you win the lottery, your income increases, so you're probably going to splurge a little more.
 - Maybe you buy that sailboat?!



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.

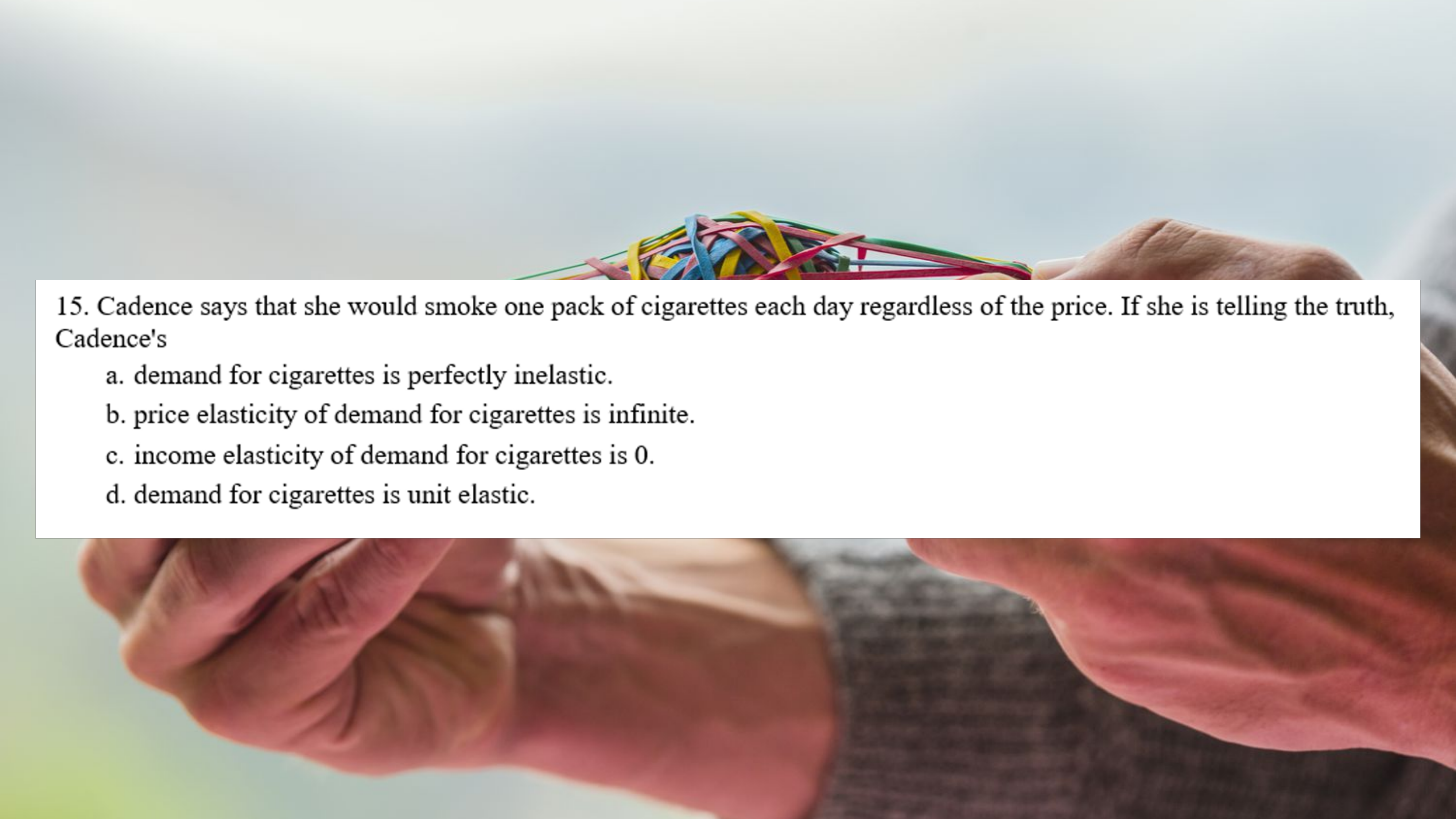
$$E_{12} = \frac{\% \Delta Q_d^1}{\% \Delta P^2}$$

Cross-Price Elasticity of Demand

- Substitutes
 - Positive cross-price elasticity.
 - Ex: If the price of Coke rises, you buy more Pepsi.
- Complements
 - Negative cross-price elasticity.
 - Ex: If the price of hot dog buns increases, you buy fewer hot dogs.

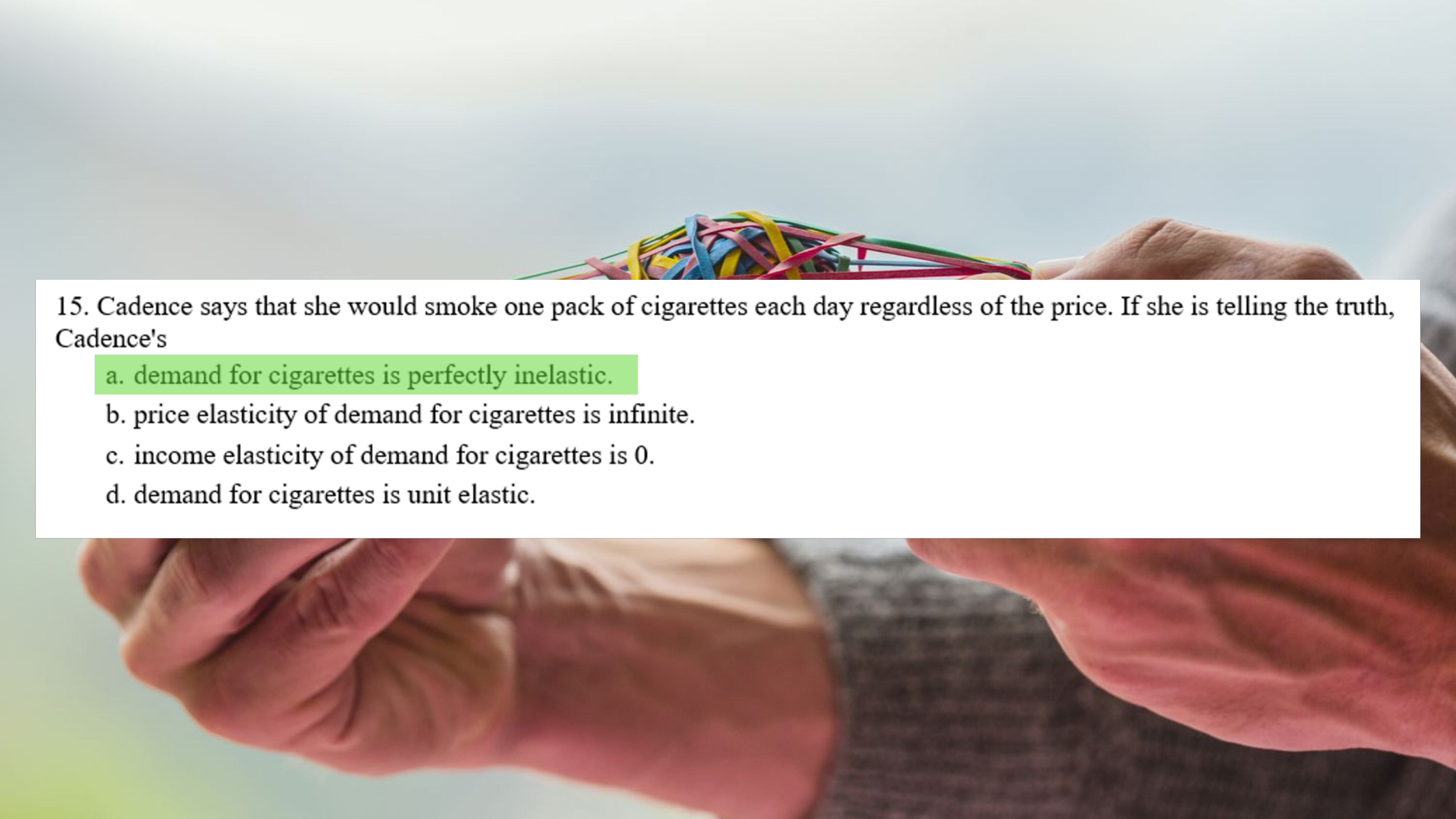
A close-up photograph of two hands holding a ball of multi-colored rubber bands. The ball is made of many thin, interwoven rubber bands in various colors including red, yellow, blue, and green. The hands are positioned on either side of the ball, with fingers gripping the ends of the bands. The background is a soft, out-of-focus landscape with a blue sky and a dark, textured foreground. The word "PRACTICE" is overlaid in white text on a black rectangular background in the lower center of the image.

PRACTICE



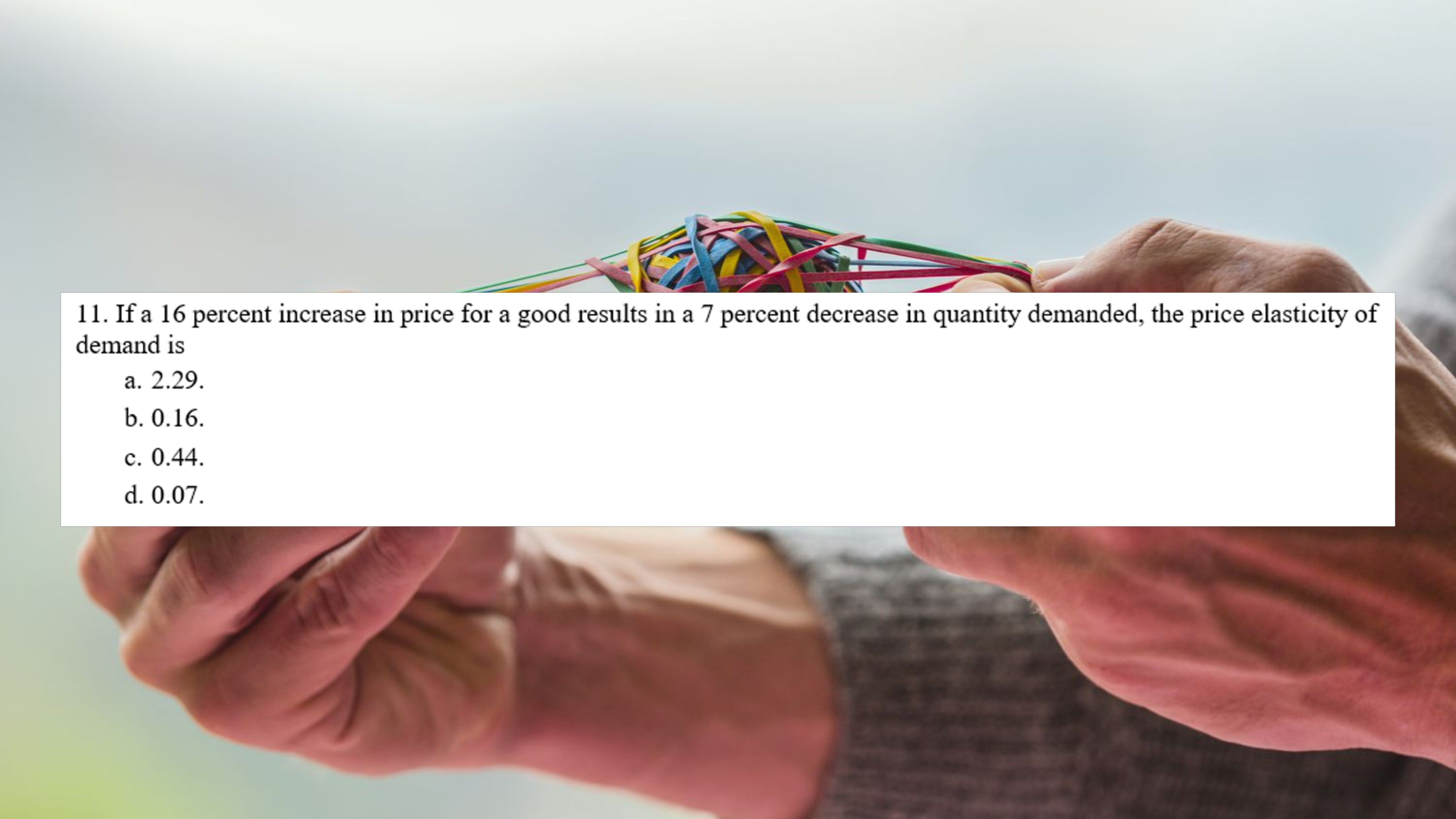
15. Cadence says that she would smoke one pack of cigarettes each day regardless of the price. If she is telling the truth, Cadence's

- a. demand for cigarettes is perfectly inelastic.
- b. price elasticity of demand for cigarettes is infinite.
- c. income elasticity of demand for cigarettes is 0.
- d. demand for cigarettes is unit elastic.

A close-up photograph of a hand holding a bundle of colorful rubber bands. The bands are in various colors including red, yellow, blue, and green. The hand is positioned on the right side of the frame, with the fingers gripping the bundle. The background is a soft, out-of-focus light blue and white.

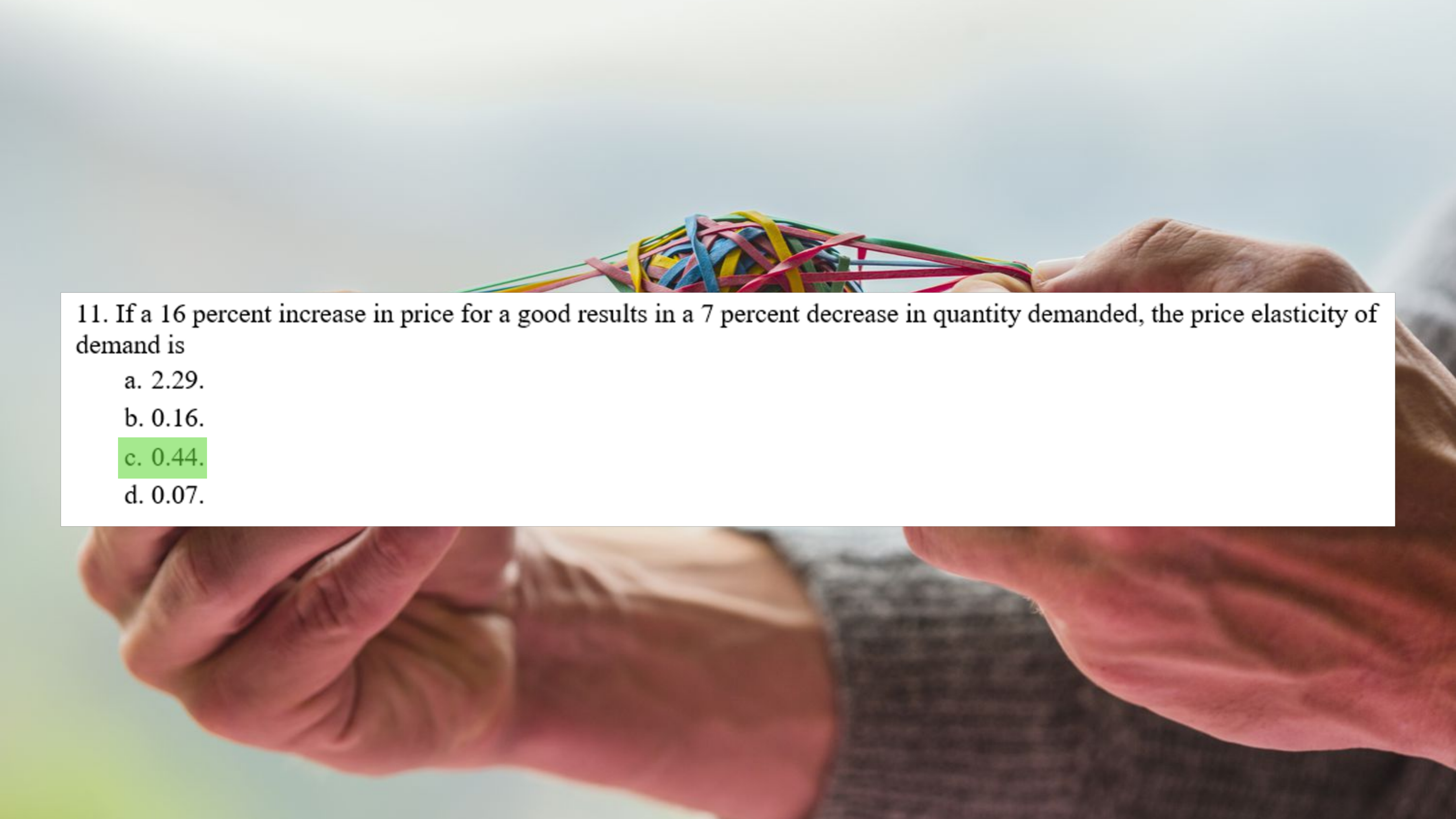
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11. If a 16 percent increase in price for a good results in a 7 percent decrease in quantity demanded, the price elasticity of demand is

- a. 2.29.
- b. 0.16.
- c. 0.44.
- d. 0.07.





11. If a 16 percent increase in price for a good results in a 7 percent decrease in quantity demanded, the price elasticity of demand is



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b. 0.16.

c. 0.44.

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- 
- A close-up photograph of a hand holding a bundle of colorful rubber bands. The bands are in various colors including red, blue, yellow, and green. The hand is positioned on the right side of the frame, with the fingers gripping the bundle. The background is a soft, out-of-focus light blue.
9. If the price elasticity of demand for a good is 5, then a 10 percent increase in price results in a
- a. 0.50 percent decrease in the quantity demanded.
 - b. 2.00 percent decrease in the quantity demanded.
 - c. 50.00 percent decrease in the quantity demanded.
 - d. 100.00 percent decrease in the quantity demanded.
- 
- A close-up photograph of a hand holding a pen. The hand is positioned on the left side of the frame, with the fingers gripping the pen. The background is a soft, out-of-focus light blue.

- 
9. If the price elasticity of demand for a good is 5, then a 10 percent increase in price results in a
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- 

Elasticities & Business

- Businesses rely on elasticities all the time!
- Cross-Price Elasticities
 - Very useful when trying to outsell your competitor!
 - How responsive is the quantity demanded of my product following a change in my competitor's product, vice-versa.

A close-up photograph of two hands holding a ball of colorful rubber bands. The ball is made of many interwoven rubber bands in various colors including red, yellow, blue, green, and pink. The hands are positioned on either side of the ball, with fingers gripping the ends of the bands. The background is a soft, out-of-focus landscape with a blue sky and a green field. At the bottom center of the image, there is a black rectangular box containing the text "THANKS FOR YOUR ATTENTION" in white, bold, uppercase letters.

THANKS FOR YOUR ATTENTION