

Price Elasticity of Demand

is a number representing the percentage change in quantity demanded resulting from each 1 percent change in the price of a good.

Price Elasticity

$$E_p = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

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

The ratio of the two percentages is a number without units.

Example

- Price of cars increases 1%
- Quantity demanded decreases 2%

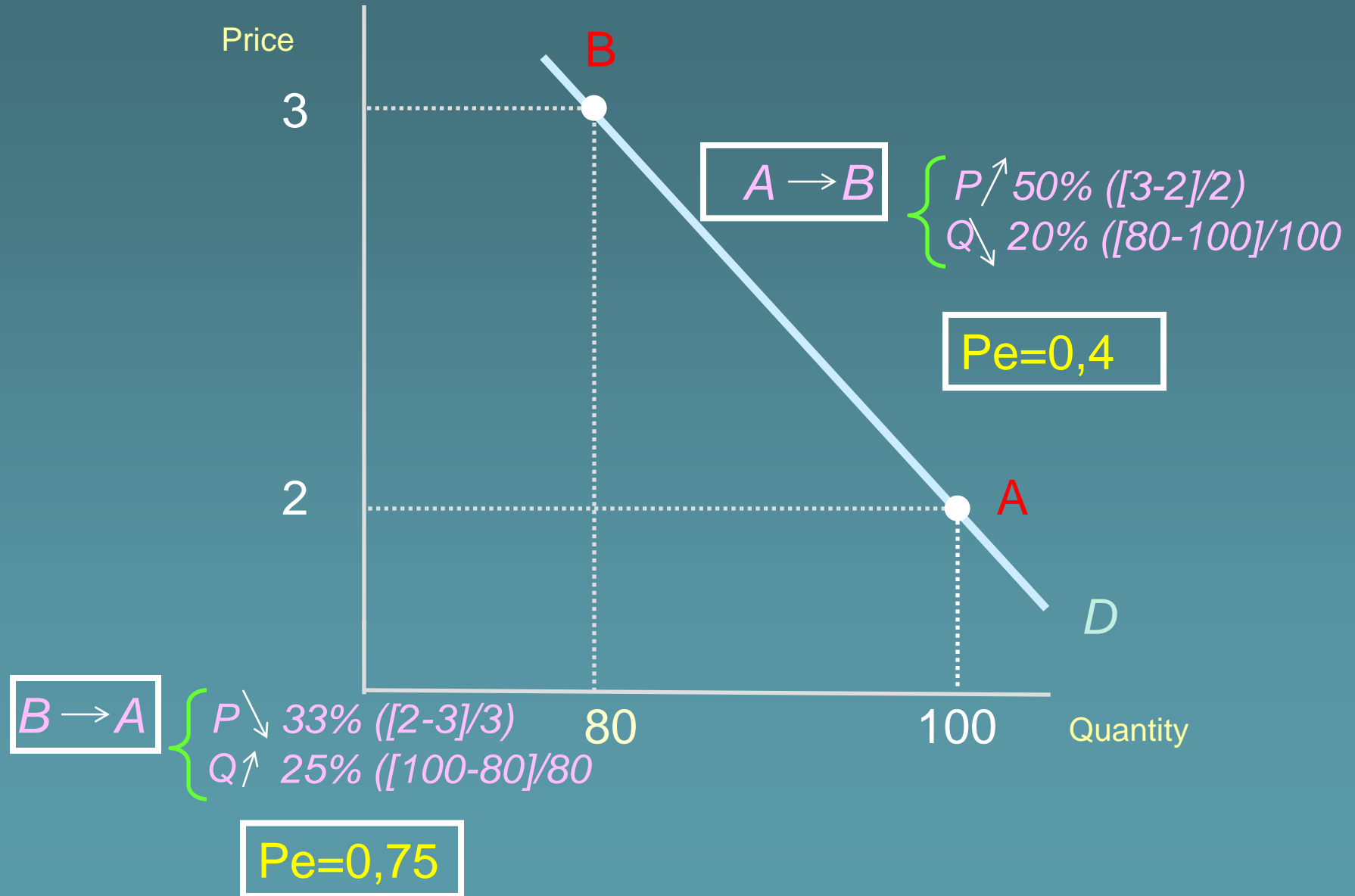
$$E_p = \frac{-2\%}{+1\%} = \ominus 2$$

When calculating the price elasticity of demand, we ignore the minus sign for % change in Q.

Midpoint Method for Elasticity

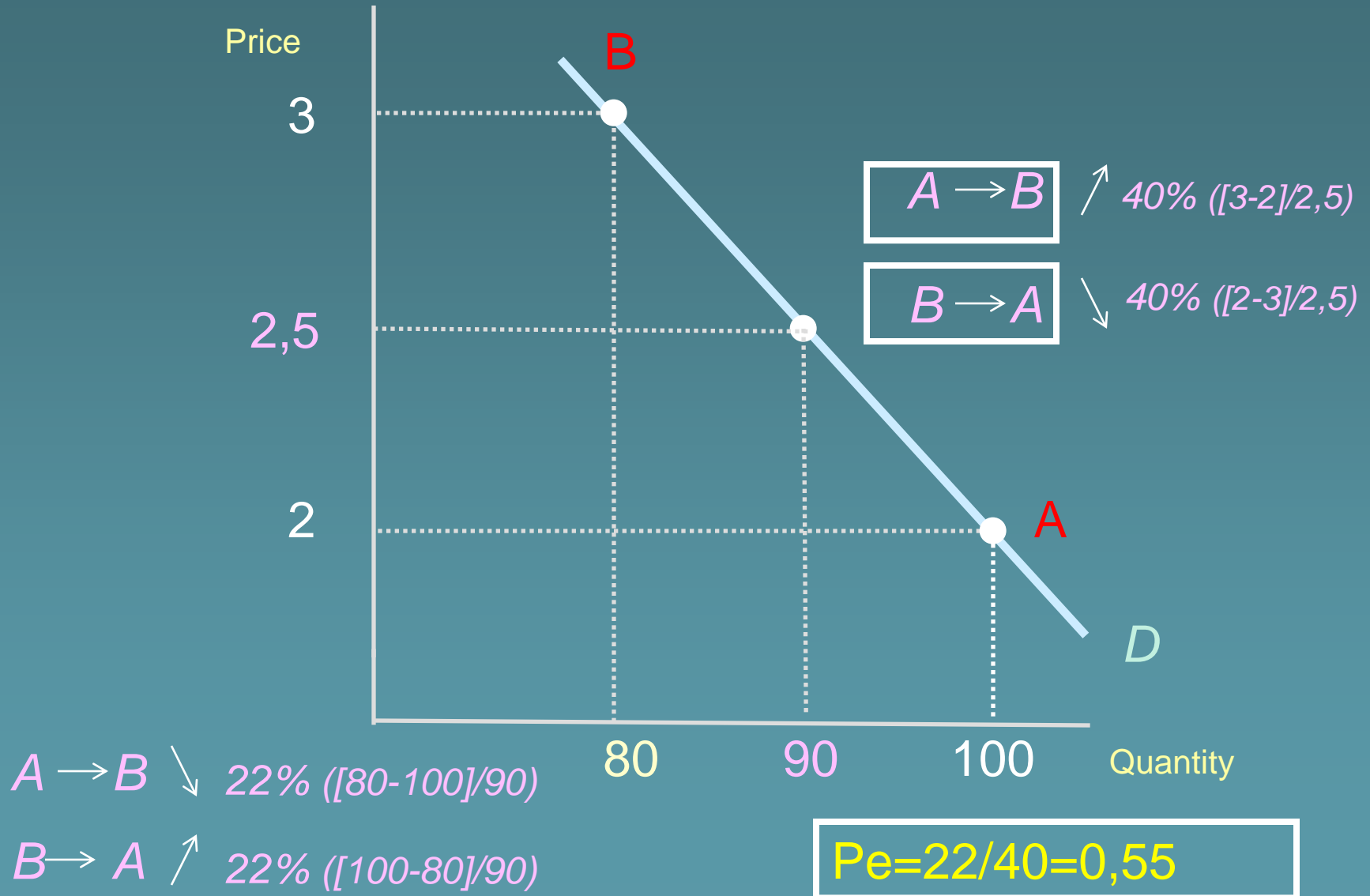
To calculate elasticity, instead of using simple percentage changes in quantity and price, economists sometimes use the average percent change in both quantity and price.

Elasticity Between Two Points on a Curve



$$P_{\text{ave}} = 1/2(2+3) = 2,5$$

$$Q_{\text{ave}} = 1/2(100+80) = 90$$



Midpoint Method for Elasticity

$$E_p = \frac{\text{Change in } Q}{\text{Sum of quantities}/2} \bigg/ \frac{\text{Change in } P}{\text{Sum of prices}/2}$$

or

$$E_p = \frac{\text{Change in } Q}{(Q_1 + Q_2)/2} \bigg/ \frac{\text{Change in } P}{(P_1 + P_2)/2}$$

or

$$E_p = \frac{\Delta Q}{\text{Avg. } Q} \bigg/ \frac{\Delta P}{\text{Avg. } P}$$

How to Use Price Elasticity of Demand to Make Market Forecasts

$$Q = 10,000 \text{ cars}$$

$$\Delta P = 10\%$$

$$E_p = -2.$$

$$E_p = \frac{\% \text{ change in quantity demanded}}{10} = -2$$

$$\% \text{ change in quantity demanded} = -20\%.$$

How to Use Price Elasticity of Demand to Make Market Forecasts

$$\Delta Q = 20\%$$

$$E_p = -4.$$

$$E_p = \frac{20\%}{\% \text{ change in price}} = -4$$

$$\% \text{ change in price} = -5\%.$$

Categorizing Price Elasticity of Demand As Elastic or Inelastic

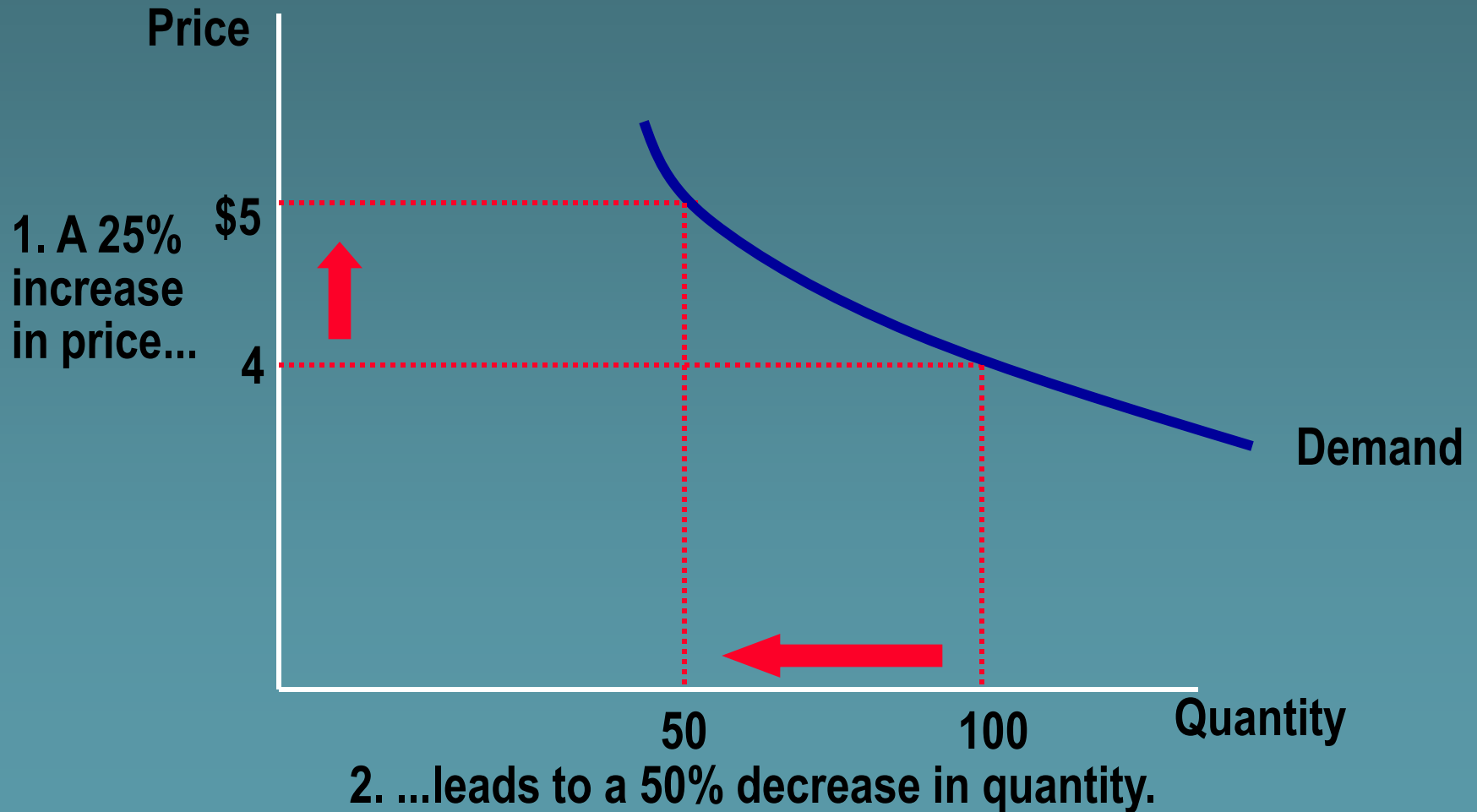
Elastic Demand

- ◆ *Percentage change in quantity demand is greater than percentage change in price.*
- ◆ *Price elasticity of demand is greater than one.*

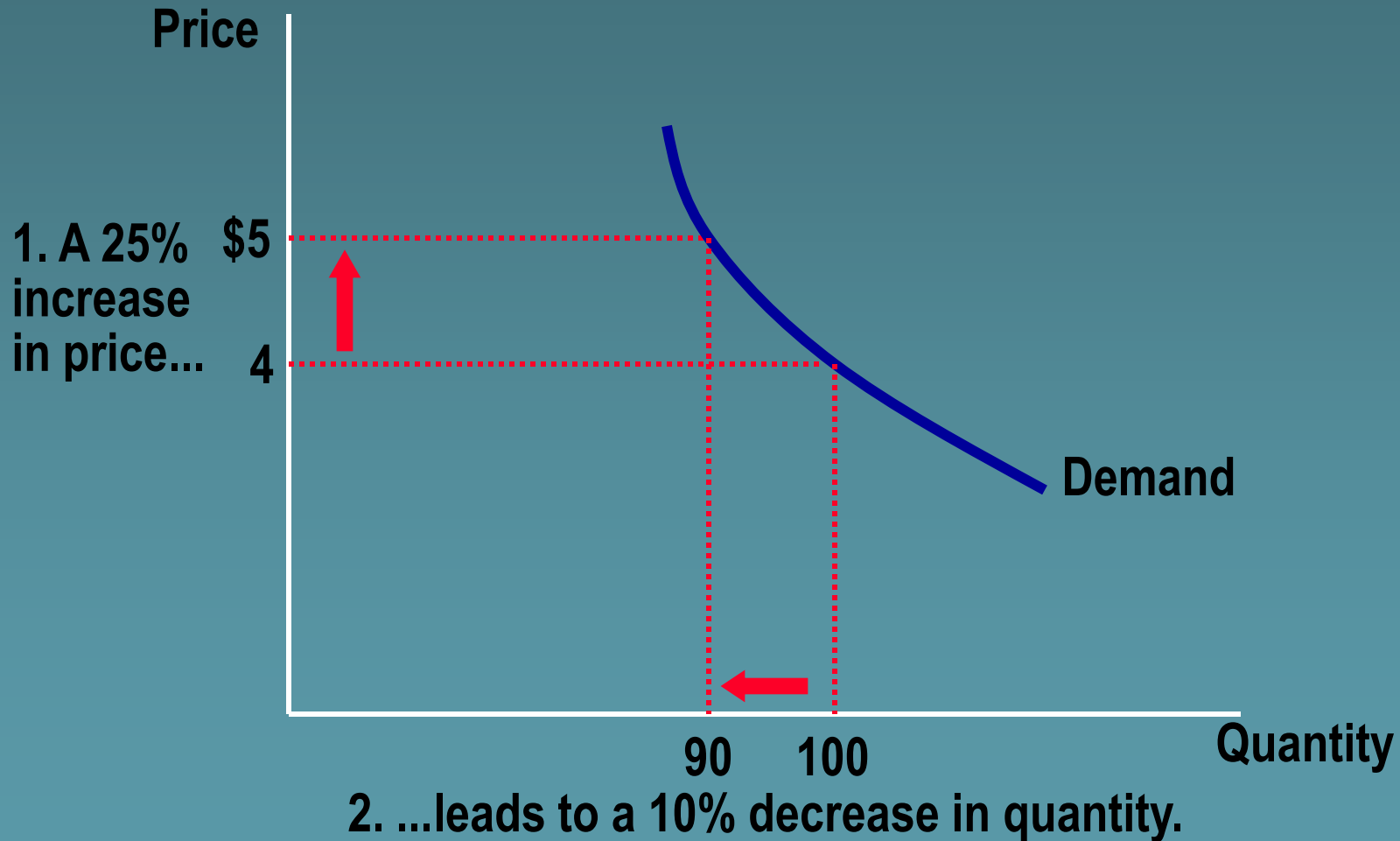
Inelastic Demand

- ◆ *Percentage change in price is greater than percentage change in quantity demand.*
- ◆ *Price elasticity of demand is less than one.*

Box 1. Elastic Demand

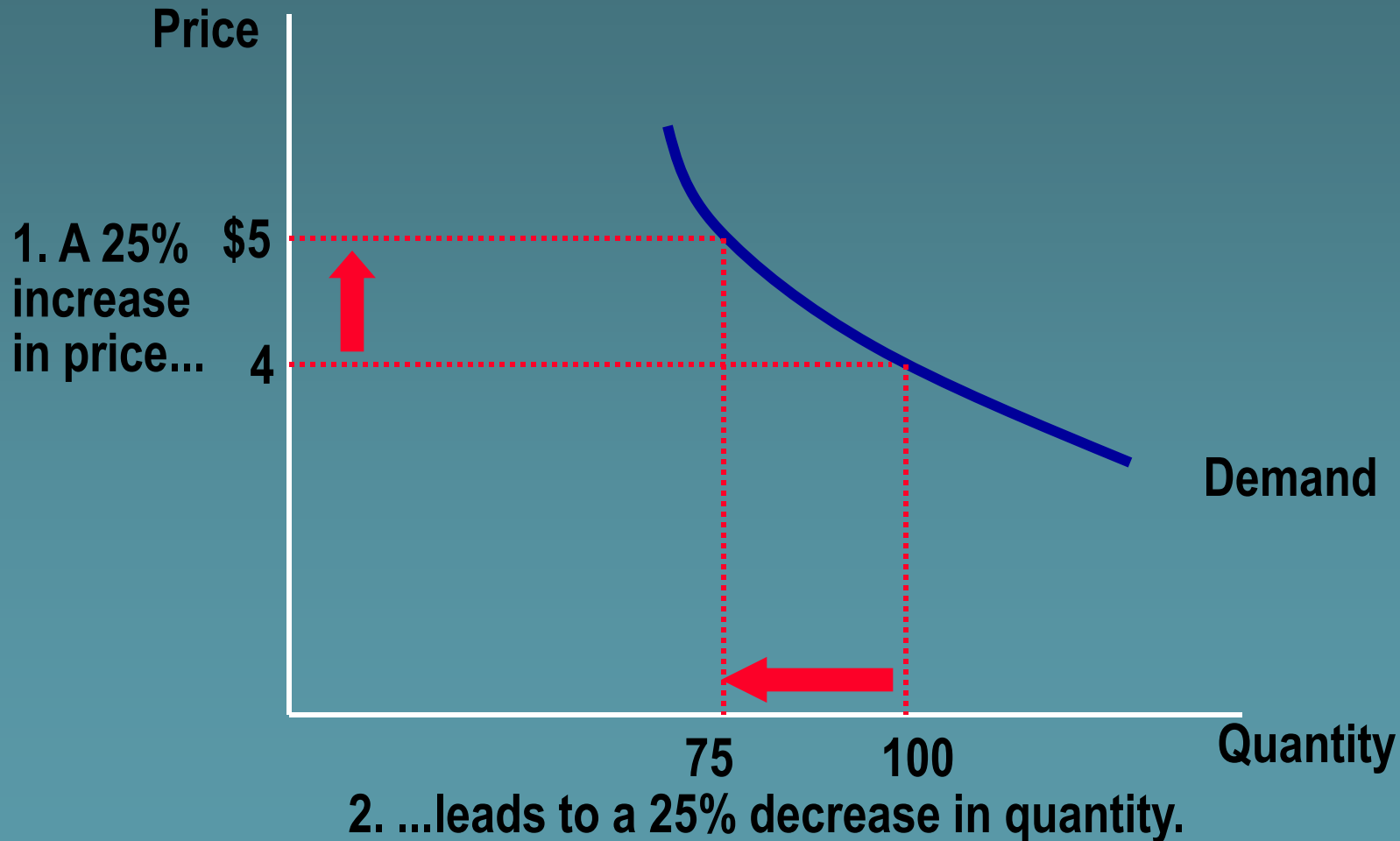


Box 2. Inelastic Demand



Box 3. Unit Elastic Demand

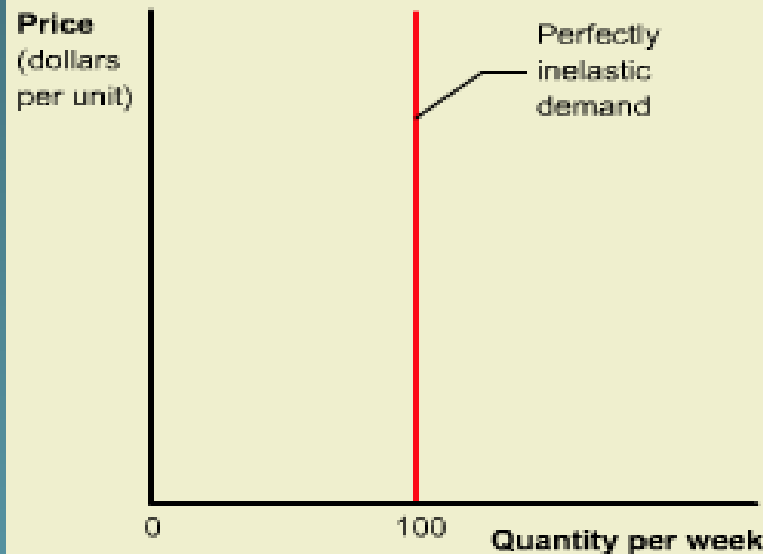
- Elasticity equals 1



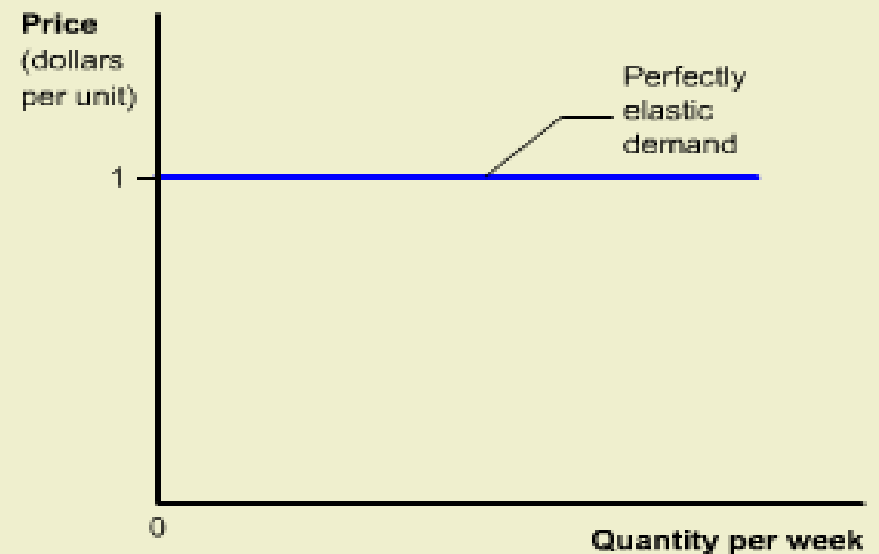
Determinants of Price Elasticity of Demand

- 1. The availability of substitutes*
- 2. Time*
- 3. The proportion of income consumers spend on the good*

Box 4. Perfectly Inelastic and Perfectly Elastic Demand Curves



A. A perfectly inelastic demand curve is a vertical line. The quantity demanded does not change in response to price changes.



B. A perfectly elastic demand curve is a horizontal line. The quantity demanded can change to any value without any change in price.

Elasticity and Total Revenue

- ◆ *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.

$$TR = P \times Q$$

The Total Revenue Test for Elasticity

	Increase in Price	Decrease in Price
elastic demand	Decrease in Total Revenue	Increase in Total Revenue
inelastic demand	Increase in Total Revenue	Decrease in Total Revenue