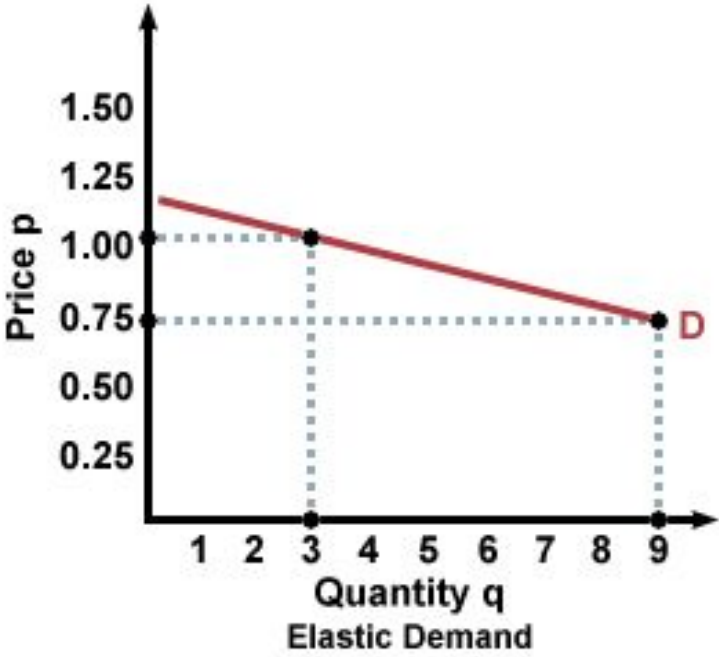
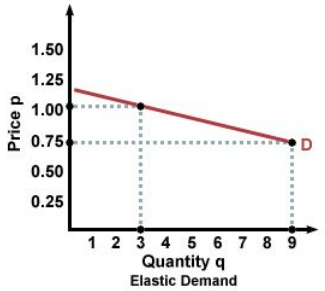
Elasticity and total revenue



Summary of elasticity

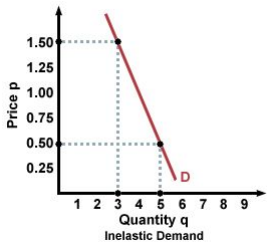
- Elastic demand : E > 1

% changes in quantity > % price changes



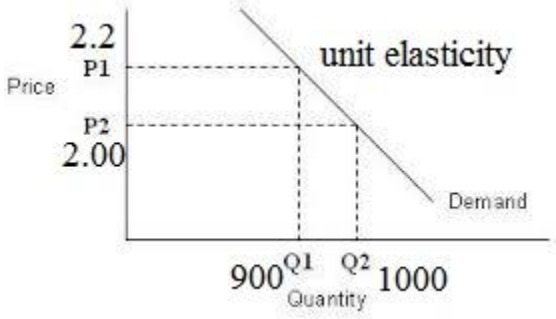
- Inelastic demand : E < 1

% price changes > % changes in quantity

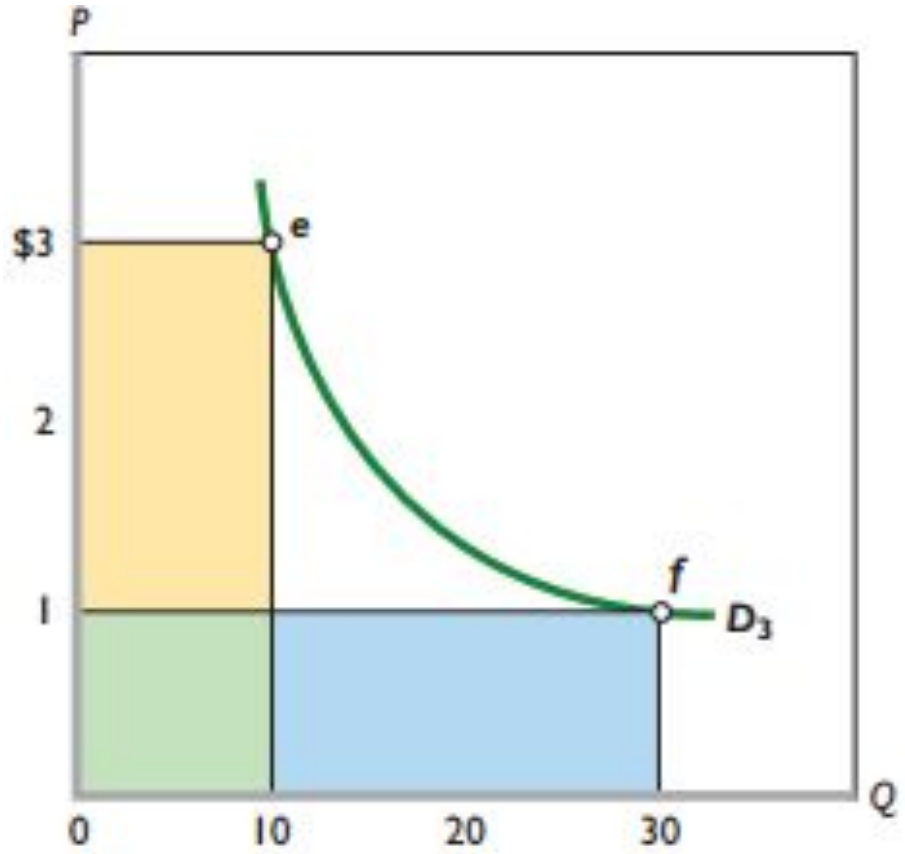


- Unit elastic demand : E = 1

%changes in quantity = %price changes



Example 1



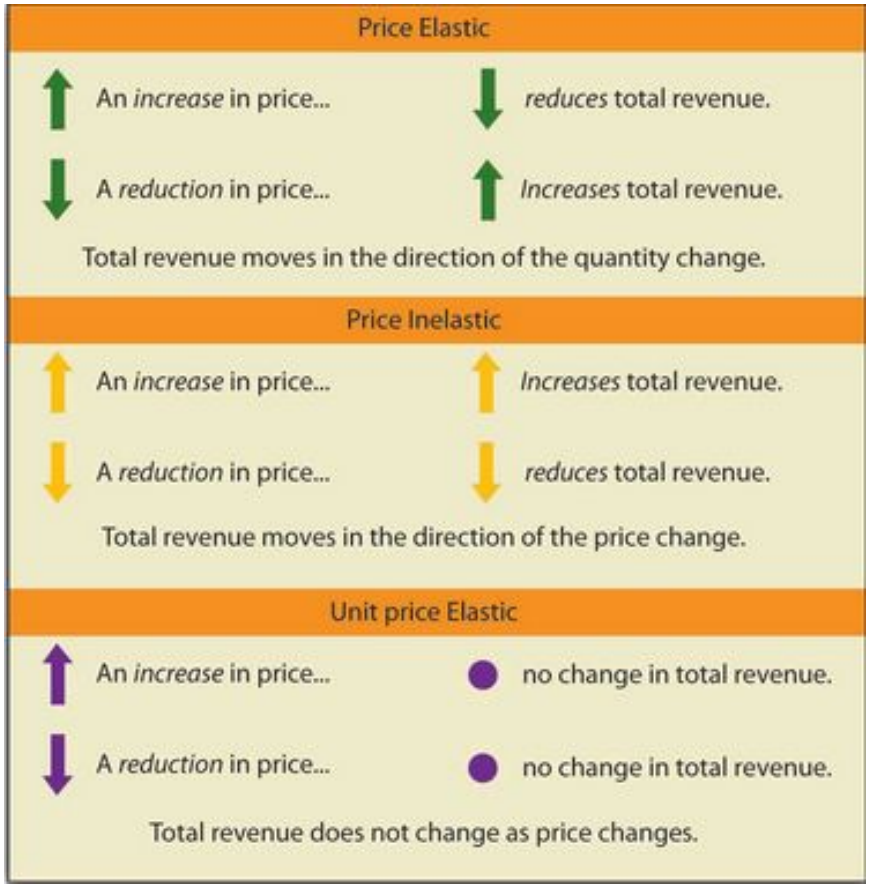
Total revenue

- Total revenue (TR) is the total amount the seller receives from the sale of a product in a particular time period; it is calculated by multiplying the product price (P) by the quantity sold (Q). In equation form:

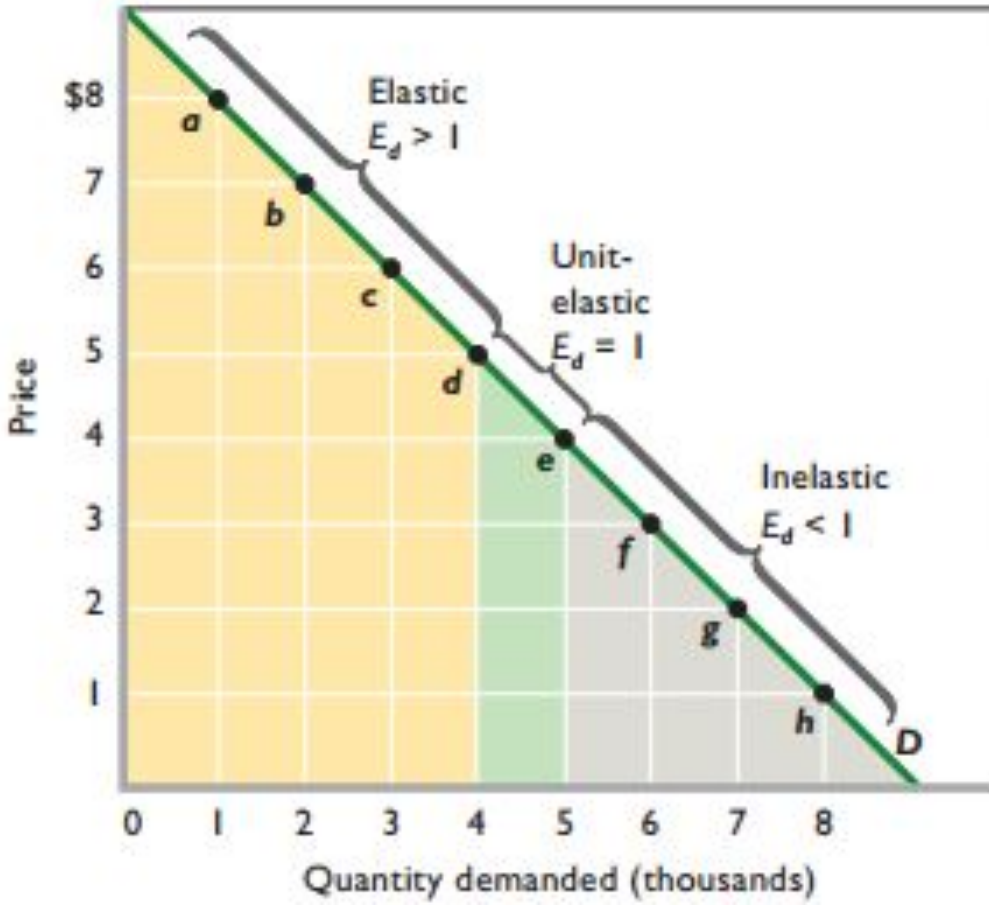
$$TR = P \times Q$$

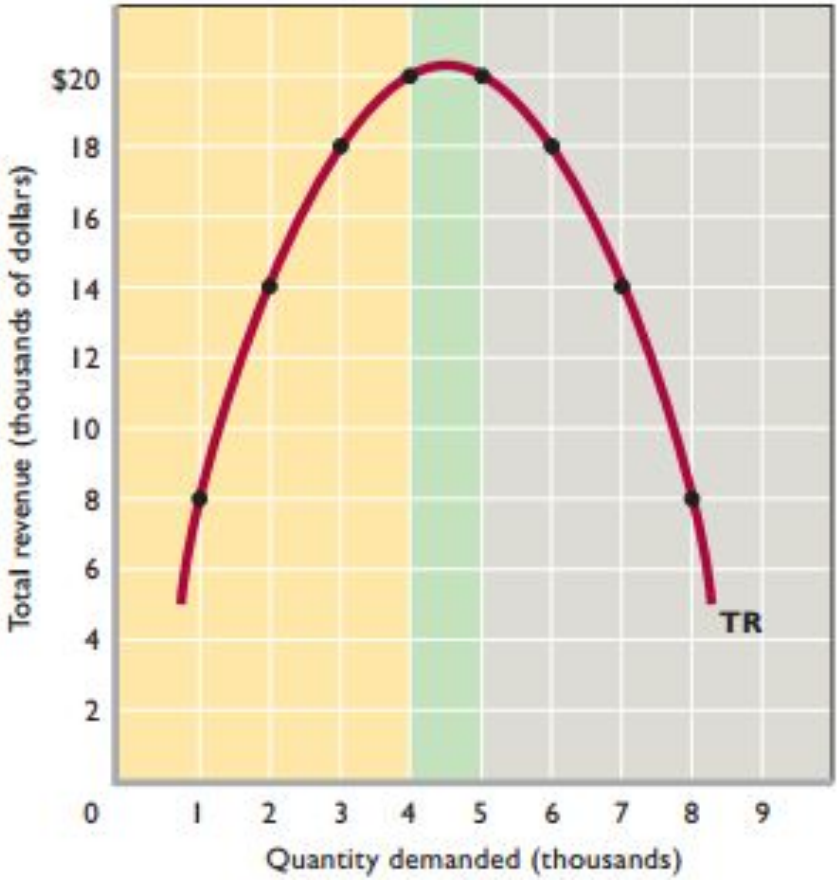
Relationship between price elasticity of demand with TR

- Elastic demand : much changes in Quantity; therefore changes in price is in opposite direction of TR.
- Inelastic demand : much changes in Price; therefore changes in price is in same direction of TR.
- Unit elastic demand: changes in Price does NOT change the TR.



Relationship between price elasticity of demand with TR





Example 2

- Several years ago the National Association of Broadcasters imposed restrictions on the amount of non-program material (commercials) that could be aired during children's television shows, effectively reducing the quantity of advertising allowed during children's viewing hours by 33 percent. Within four months, the price of a minute of advertising on network television increased by roughly 14 percent. What impact do you think this had on the revenues of the networks?

% change in Quantity of advertisements reduced by 33%

% change in Price of advertising rises by 14%

$$E = \frac{33\%}{14\%} = 2.35 \quad \text{(Elastic demand)}$$

As the Price-Elasticity Coefficient is more than 1; therefore this is elastic demand. Hence, Increase in price will decrease the total revenue.

Determinants of Price Elasticity of Demand

- **Substitutability:** the larger the number of substitute goods that are available, the greater the price elasticity of demand.
- Demand for Reebok sneakers is more elastic than is the overall demand for shoes

- **Essential versus luxury:** essential good are less elastic while luxury goods are more elastic.
- vacation travel and jewelry are luxuries, which, by definition, can easily be forgone. If the prices of vacation travel and jewelry rise, a consumer need not buy them and will suffer no great hardship without them

Determinants of Price Elasticity of Demand

- **Proportion of Income**: the higher the price of a good relative to consumers' incomes, the greater the price elasticity of demand.
- High price of product = high elastic (car)
- low price of product = low elastic (pencil)

Example 3

- A study sponsored by the American Medical Association suggests that the absolute value of the price elasticity for surgical procedures is smaller than that for the price elasticity for office visits. Explain why this would be expected.

Example 3 (answer)

- The demand for surgical procedures is generally more inelastic than the demand for office visits, since most surgical procedures do not have close substitutes.
- The high substitutability in office visit cause the more price elasticity rather than surgical procedure. In contrast, there are close substitutes for many types of office visits. For example, a patient can purchase over-the-counter drugs. a person might visit different type of offices like travel and tourism offices, consultancy offices, lawyer office, and etc.
- Another explanation is that surgical procedures are usually need immediately, while office visits can often wait such as dental. Essential (less elastic) versus luxury (more elastic) goods.

Example 4

- When the price of butter was "low," consumers spent $5 billion annually on its consumption. When the price doubled consumer expenditures increased to $7 billion. Recently you read that this means that the demand curve for butter is upward sloping. Do you agree? Explain.

Example 4 (answer)

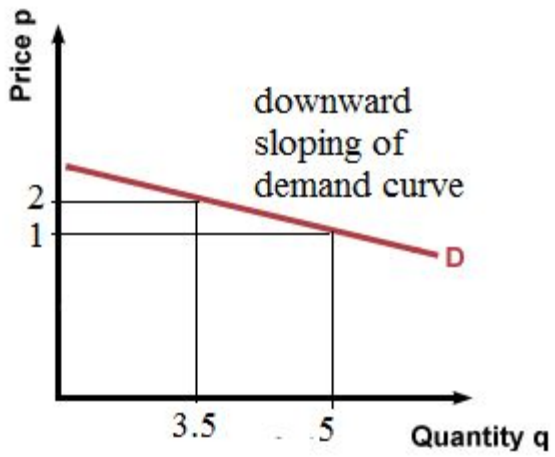
- Imagine the price for one box of butter is $1.
- If the revenue is $5 billion.

$$TR = P \times Q$$
$$5\ billion = 1 \times Q_1$$
Q_1= 5 billion butter box

- When price of 1 butter box increases double
- the price for one box of butter is $2
- the revenue is $7 billion

$$7\ billion = 2 \times Q_2$$
Q_2= 3.5 billion butter box

- Now lets draw the demand curve



- Therefore the demand curve is downward sloping

Cross Elasticity of Demand

- The cross elasticity of demand measures how sensitive consumer purchases of one product (say, X) are to a change in the price of some other product (say, Y).

$$E_{xy} = \frac{\text{percentage change in quantity demanded of product X}}{\text{percentage change in price of product Y}}$$

Example 5

- The cross-price elasticity for textbooks and copies of old exams is -3.5. If the price of copies of old exams increases by 10 percent, what will happen to the quantity demanded of textbooks?
- Note: how to understand this question is cross-price elasticity? The question is showing the elasticity for textbooks (x) and copies of old exams (y).

Example 5 (answer)

- $$E_{xy} = \frac{\%\ change\ in\ quantity\ of\ textbooks}{\%\ change\ in\ price\ of\ copies}$$

$$-3.5 = \frac{\%\ change\ in\ quantity\ of\ textbooks}{10\%}$$

$$\%\ change\ in\ quantity\ of\ textbooks = -3.5\ \times 10\%$$

$\%\ change\ in\ quantity\ of\ textbooks =$ - 35 %

(the negative sign shows that the quantity of text book reduced)

Quantity of textbooks falls by 35%.

The income elasticity of demand

- Income elasticity of demand measures the degree to which consumers respond to a change in their incomes by buying more or less of a particular good.

$$E_i = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in } income}$$

Example 6

- The income elasticity of demand for your firm's product is estimated to be 0.75. A recent report in *The Wall Street Journal* says that national income is expected to decline by 3 percent this year.
  a. What should you do with your stock of inventories?
  b. What do you expect to happen to your sales?
  c. How would you answer parts *a* and *b* if you expected a 5 percent increase in income instead of a decrease?

Example 7

- How would the following changes in price affect total revenue? That is, would total revenue increase, decrease, or remain unchanged?
- a. Price falls and demand is inelastic.
- b. Price rises and demand is elastic.
- c. Price rises and supply is elastic.
- d. Price rises and supply is inelastic.
- e. Price rises and demand is inelastic.
- f. Price falls and demand is elastic.
- g. Price falls and demand is of unit elasticity