

# Functions in Economics

## Lecture 1 Section 1.1

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# Objectives

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- To become familiar with functions used in economics.

# Function Used in Economics

## Functions Used in Economics

- **Demand function**  $D(x)$  – Gives the *price*  $p$  that must be charged for each unit in order for the consumers to be willing to *demand*  $x$  units.

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- **Demand function**  $D(x)$  – Gives the *price*  $p$  that must be charged for each unit in order for the consumers to be willing to *demand*  $x$  units.
- **Supply function**  $S(x)$  – Gives the *price*  $p$  that must be charged for each unit in order for the producers to be willing to *supply*  $x$  units.

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- **Supply function**  $S(x)$  – Gives the *price*  $p$  that must be charged for each unit in order for the producers to be willing to *supply*  $x$  units.
- **Revenue function**  $R(x)$  – Gives the *revenue*, in dollars, obtained by the producer for producing and *selling*  $x$  units. If  $p(x)$  is the price per unit when  $x$  units are produced and sold, then

$$R(x) = xp(x).$$

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- **Cost function**  $C(x)$  – Gives the *cost*, in dollars, by the producer of *producing*  $x$  units.
- **Profit function**  $P(x)$  – Gives the *profit*, in dollars, to the producer as a result of producing and *selling*  $x$  units. It may be defined as

$$\begin{aligned}P(x) &= R(x) - C(x) \\ &= xp(x) - C(x).\end{aligned}$$

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- **Average Profit function**  $AP(x)$  – Gives the *average profit* to the producer per unit produced and sold. It is defined as

$$AP(x) = \frac{P(x)}{x}.$$

## Example 1.1.5

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Suppose the demand function is

$$D(x) = -0.27x + 51$$

and the cost function is

$$C(x) = 2.23x^2 + 3.5x + 85,$$

in thousands of dollars, where  $x$  is the number of thousands of units (coffeemakers) sold. Then the price is  $p(x) = D(x)$  assuming that the producer is willing to produce  $x$  units at that price.

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- (b) Find the revenue and profit functions  $R(x)$  and  $P(x)$ .

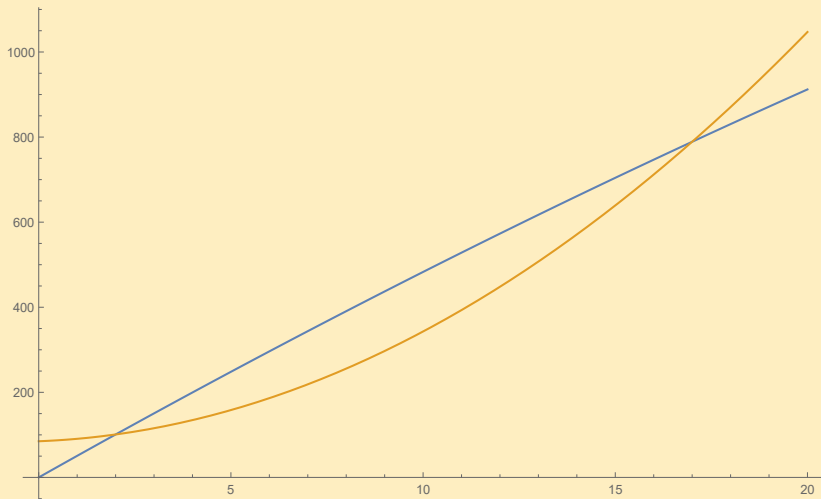
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- (a) What is the average cost of producing 4,000 coffeemakers?
- (b) Find the revenue and profit functions  $R(x)$  and  $P(x)$ .
- (c) For what values of  $x$  is production of the coffeemakers profitable?  
To answer this, we find the break-even point where  $P(x) = 0$ . On one side of that point,  $P(x) < 0$ , and on the other side,  $P(x) > 0$ .

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## Revenue and Cost



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## Profit

