Math 103 Section 1.1: Linear Equations

- Price-Demand
- Price-Supply
- Simple Interest
- Linear equation practice problems

Price versus quantity demanded:

Several companies make a 37 inch, Plasma HDTV. Right now, they sell for an average of $1440. But what if the price goes up? Then consumer demand will decrease. But if the price goes down, then consumer demand will increase. Consumer demand depends on the price.

Symbols:

- Price: p is the selling price for the TV.
- Demand: d is the number of TVs (in thousands) sold.

The quantity d of TVs sold (demanded) is related to the price p as follows:

$$d = 1720 - .50p$$

Can you see how the equation below reflects the relationship?

Price-demand equation: $d = 1720 - .50p$

We are interested in pairs of number d and p (written (d, p)) that satisfy this equation. Such a pair is called a *solution* to the equation.

What is the demand (in thousands) if the price is \$1440?

What is the demand if the price is \$2500?

What price should we charge if we want to sell 500 thousand TVs?

Price-demand equation: $d = 1720 - .50p$

The demand (in thousands) if the price is \$1440 is
$d = 1720 - (.50)(1440) = 1000$ thousand TVs (one million)

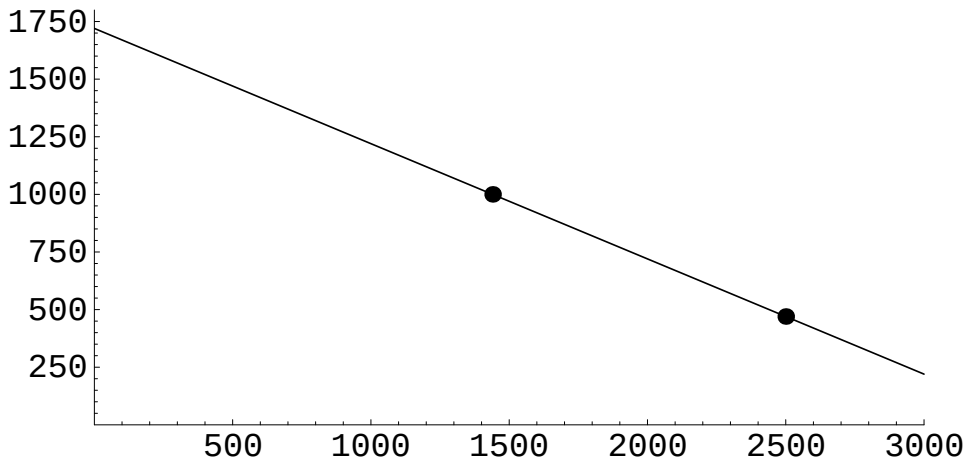
What is the demand if the price is \$1441?

The demand (in thousands) if the price is \$2500 is
$d = 1720 - (.50)(2500) = 470$ thousand TVs

What is the demand if the price is \$2501?

If price increases \$1 how does demand change?

Price-demand equation: $d = 1720 - .50p$. Represent all such solutions on a graph. Why is it straight?



What point above represents the situation where the price is \$1440?

What point above represents the situation where the price is \$2500?

What point above represents the situation where the demand is 500 thousand TVs?

Price-demand equation: $d = 1720 - .50p$.

What are some other ways to write this equation?

What would it tell us if we solved for p in terms of d?

The equation $d = 1720 - .50p$ is and example of a *linear equation in two variables.*

Price-supply:

The companies that make the 37 inch HDTVs are willing to produce more TVs if they can sell them at a higher price. So the supply of TVs is also related to the price at which these TVs will sell.

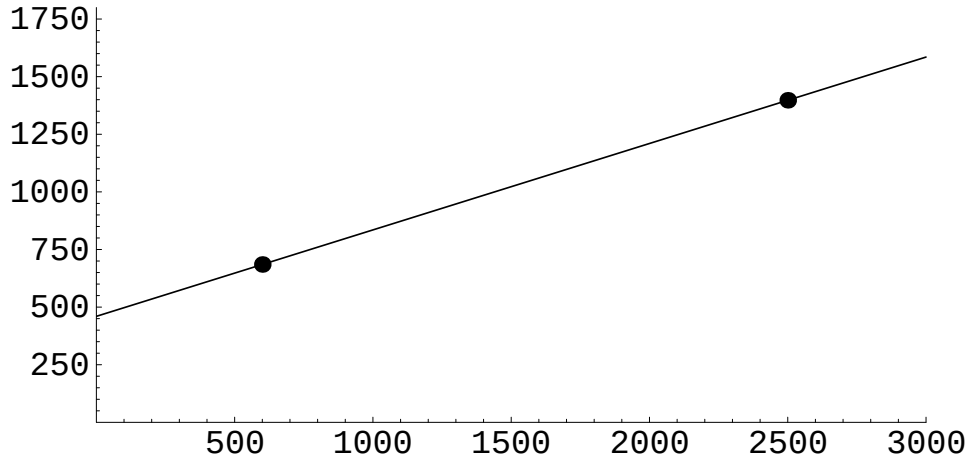
The supply equation in this case is:

$$s = .375p + 460$$

Again, supply is measured in thousands of TVs. This is also a linear equation in two variables.

How does this equation match the description above?

Price-supply equation: $s = .375p + 460$. Again we can represent many solutions at once with a graph. Moreover we can use the graph to answer questions about the equation.

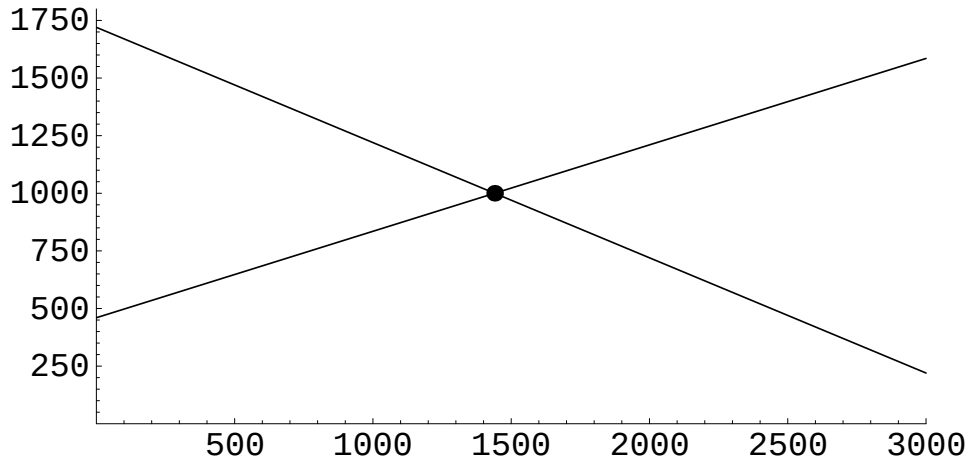


What is the supply (in thousands) if the price is \$600?

What is the supply if the price is \$2500?

At what price does the quantity demanded match the quantity supplied?

Price-demand function: $d = 1720 - .50p$
Price-supply function: $s = .375p + 460$



Solve $d = s$. What does this have to do with the price p? Did you have a linear equation? In how many variables?

Simple Interest Formula:

Consider the following Symbols

- Principal P
- Interest rate (annual) r
- Time t
- Amount of money at end of investment period.

These are also related by a linear equation: $A = P + Prt$.

Solve for r. What does this mean?

Solve for t. What does this mean?

More Practice:

[Matched problem 8 Section1.1] Mary paid 8.5% sales tax and a $190 title and license fee when she bought a new car for a total of $28,400. Wghat is the purchase price of the car?

More Practice:

[Matched problem 9 Section1.1] How many CDs would a recording company have to make and sell to break even if the fixed costs are $18,000, variable costs are $5.20 per CD and the CDs are sold to retailers for $7.60 each?