Section 1.2

Application of Lines

A linear equation is in the form $f(x) = mx + b$

The notation $f(a)$ represents the value of the equation when $x = a$.

ex) Let $f(x) = 3x + 7$. Find:

$f(2)$

$f(-4)$

$f(t)$

<u>Cost, Revenue, Profit</u>

Cost, $C(x)$, is the total cost to produce x units

$C(x) = mx + b$

m: marginal (or unit) cost

b: fixed cost

Revenue, $R(x)$, is the total revenue from selling x units

$R(x) = mx$

m: marginal revenue

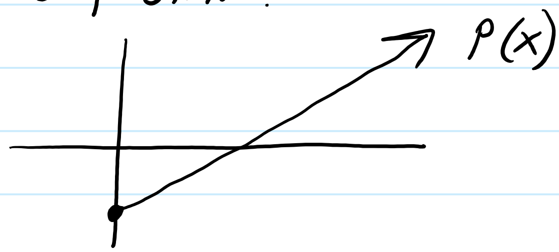
Profit, $P(x)$, is the total profit from selling x units

$P(x) = R(x) - C(x)$

ex) Ethan owns a small publishing house. His fixed costs to publish a book is $\$525$ and his total cost to produce 1000 books is $\$2,675$. He sells the books for $\$7$ each. Find the cost, revenue, and profit equations.

The break-even point is the number of units that need to be sold so that profit is equal to zero. It is usually used to find the number of units that need to be sold so that profit becomes positive.

$P(x) = 0$



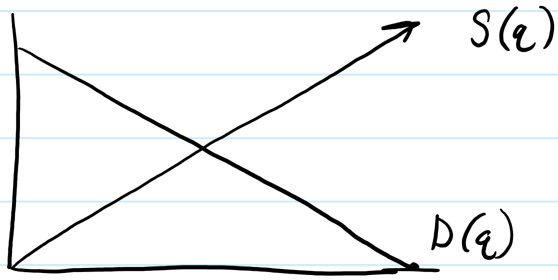
ex) The cost and revenue to produce x trinkets is $C(x) = 12x + 37$ and $R(x) = 18x$. Find the profit from selling 50 trinkets and find the break-even point.

Supply and Demand

The price, p, of a commodity is related to the quantities, q, supplied and demanded by the equations

Supply: $p = S(q)$, $m > 0$
Demand: $p = D(q)$, $m < 0$

The equilibrium point is the quantity and price so that supply is equal to demand. $(S(q) = D(q))$



ex) The supply and demand for peanut butter is given by $p = D(q) = 5 - 0.25q$ and $p = S(q) = 0.25q$ where q is quantity (in hundreds of jars) and p is the price (in dollars per jar)

a) Find the supply and demand at a price of \$2 per jar

b) Find the equilibrium point.