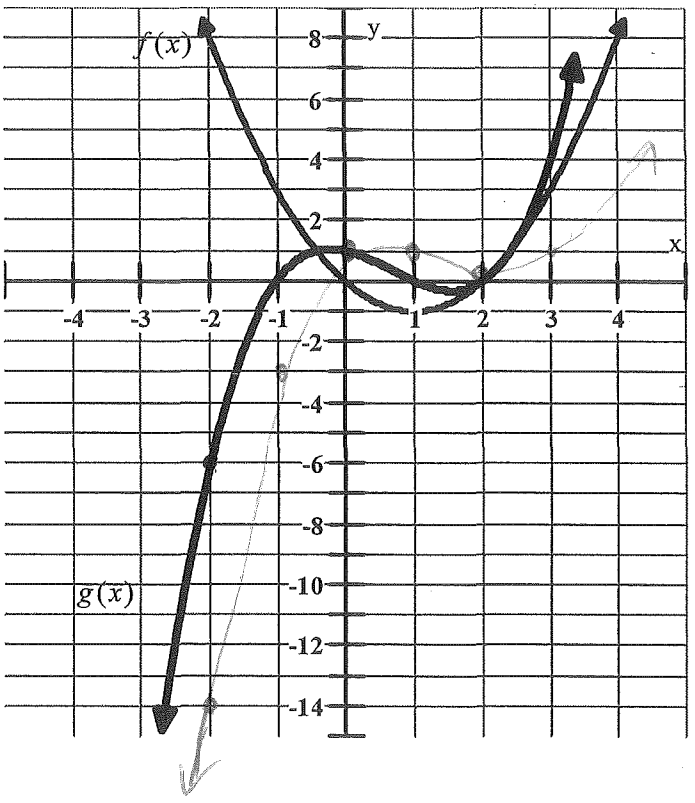
Day 1 – Sum or Difference of Functions

- In this unit, we will be looking at how functions can be combined.
- Some combined functions are formed by adding or subtracting two or more functions.
- The **superposition** principle states that the sum (or difference) of two functions can be found by:

adding / subtracting y-coordinates.

EX 1 – Given $f(x) = (x-1)^2 - 1$ and $g(x) = \frac{1}{2}(x+1)(x-1)(x-2)$, graph the function $h(x) = g(x) - f(x)$

x	$g(x)$	$f(x)$	$h(x) = g(x) - f(x)$
-2	-6	8	$-6-8=-14$
-1	0	3	$0-3=-3$
0	1	0	$1-0=1$
1	0	-1	$0-(-1)=1$
2	0	0	$0-0=0$
3	4	3	$4-3=1$



State the domain and range for $h(x)$

$\{x \in \mathbb{R}\}$

EX 2 - Given $f(x) = 2(x-3)^2 + 1$ and $g(x) = 5x - 7$, write an equation for the function $h(x) = f(x) + g(x)$

$= 2(x-3)^2 + 1 + 5x - 7$

$= 2(x^2 - 6x + 9) + 1 + 5x - 7$

$= 2x^2 - 7x + 12$

EX 3 - Student Council is selling T-shirts to raise money for new volleyball equipment. There is a fixed cost of $200 for producing the T-shirts, plus a variable cost of $5 per shirt made. Council has decided to sell the T-shirts for $8 each $R(t) = 8t$

a) Write the cost $C(n)$ and revenue $R(n)$ equations for n number of tshirts.

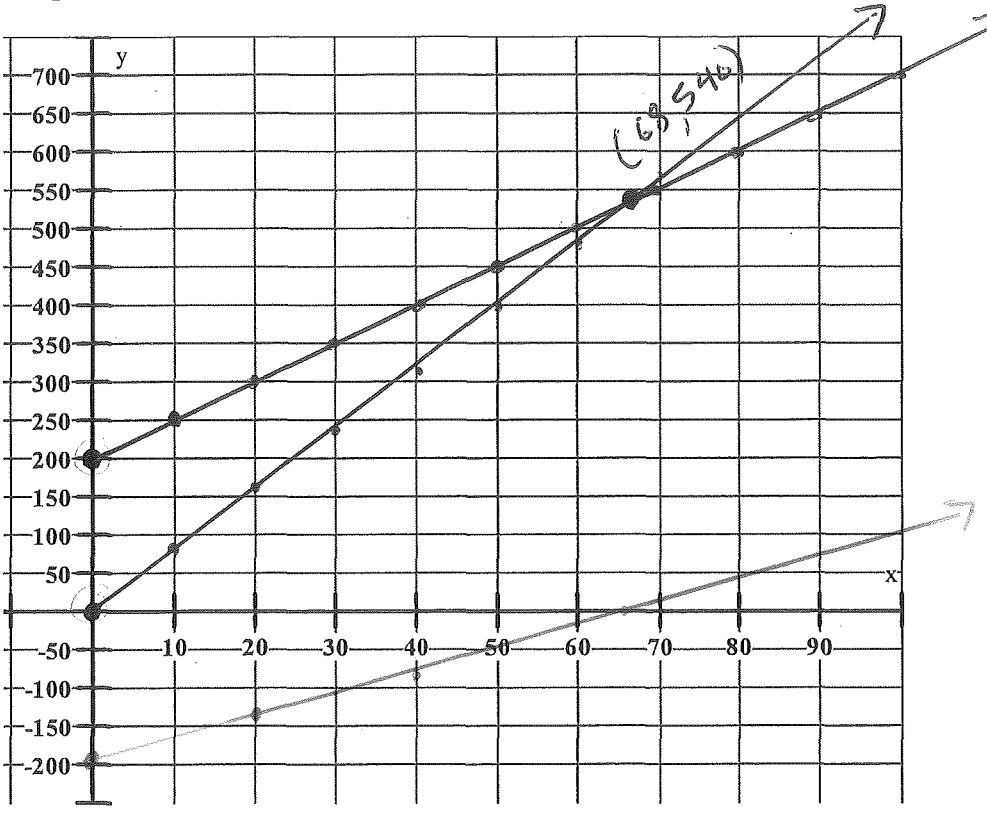
$C(n) = 5n + 200$ (5n: variable cost; 200: fixed cost) $m = 5$ $b = 200$

$R(n) = 8n$ $m = 8$ $b = 0$

b) Graph each function. Identify the point of intersection and explain its meaning. $C(n) = R(n)$

Break even point

Profit = 0



c) Profit, $P(n)$, is the <u>difference</u> between revenue and cost. Write a profit equation and graph this function on the axes above.

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

$= 8n - (5n + 200)$

$= 3n - 200$

Break even:

$3n - 200 = 0$

$n \doteq 66.67$

$= 66$

d) State the domain and range for the $R(n)$, $C(n)$ and $P(n)$ functions.

	Domain	Range
$R(n)$	$\{n \in \mathbb{N}, n \geq 0\}$	$\{n \in \mathbb{N}, n \geq 0\}$ → $8n$
$C(n)$	$\{n \in \mathbb{N}, n \geq 0\}$	$\{n \in \mathbb{N}, n \geq 200\}$ → $200 + 5n$
$P(n)$	$\{n \in \mathbb{N}, n \geq 0\}$	$\{n \in \mathbb{Z}, n \geq -200\}$ → $-200 + 3n$

Homework: Page 424 #4-7, 10 & next page in package.