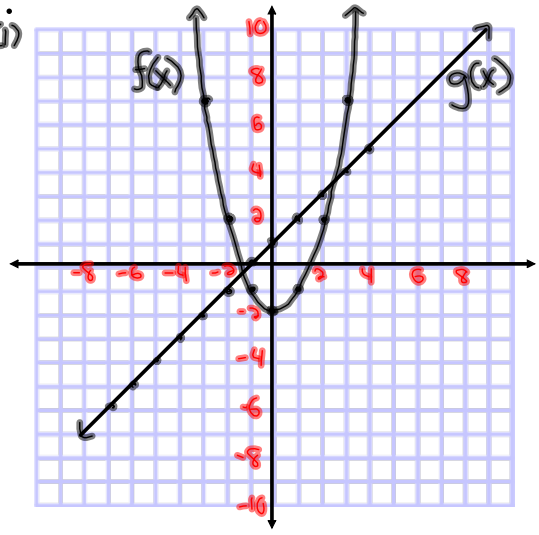
Questions From Homework

6) i)



a) $f(g(2))$

* $g(2) = 3$

$f(3) = 7$

b) $g(f(-3))$

* $f(-3) = 7$

$g(7) = 8$

8)

x	p(x)
-3	-7
-1	-3
0	-1
1	3
3	4
5	0

x	q(x)
-4	8
* -2	5
0	1
2	-4
4	-7
6	-11

a) $p(q(-2))$

$= p(5)$

$= 0$

9) $g(x) = 2 - 5x - x^2$

f) $(g \circ g)x$

$= g(g(x))$

$= g(2 - 5x - x^2)$

$= 2 - 5(2 - 5x - x^2) - (2 - 5x - x^2)^2$

$= 2 - 5(2 - 5x - x^2) - (2 - 5x - x^2)(2 - 5x - x^2)$

$= 2 - 10 + 25x + 5x^2 - (4 - 10x - 2x^2 - 10x + 25x^2 + 5x^3 - 2x^2 + 5x^3 + x^4)$

$= -8 + 25x + 5x^2 - 4 + 10x + 2x^2 + 10x - 25x^2 - 5x^3 + 2x^2 - 5x^3 - x^4$

$= -x^4 - 10x^3 - 16x^2 + 45x - 12$

Polynomial Functions

Polynomial - an algebraic expression consisting of two or more terms. A polynomial usually contains only one variable. Within each term the variable is raised to a non-negative integer power, and is multiplied by a constant. The simplest types of polynomials are binomials (two terms) and trinomials (three terms)

Degree of a Polynomial - the greatest power to which the variable is raised; for example, the degree of the trinomial $x^4 - 2x + 5$ **is 4**

A *polynomial* function with real coefficients can be represented by

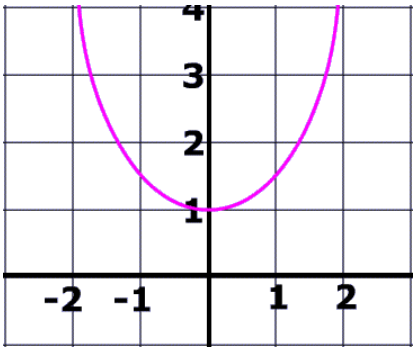
$$y = f(x) = ax^n + bx^{n-1} + cx^{n-2} + \ldots + x^0$$

where *a, b, c, etc.* are real numbers. The shape of the graph of the function is affected by the value of *n* (*the Degree of the Polynomial*), the values of the cooefficients, and whether the value of *a* is positive or negative.

Quadratics

2nd degree Polynomials. ⟷ $y = ax^2 + bx + c$

(Parabolas)



When given a quadratic function we can determine several important features to help us graph the function

We already know how to find the vertex... Remember "*completing the square?"*

What are the Roots of a Function?

Remember Quadratic Functions will have
(i) two different real roots,
(ii) two equal real roots, or
(iii) two complex roots.

- x intercepts
- zeroes of the function

Make a detailed sketch of the following Quadratic Functions

$y = x^2 + 8x + 12$

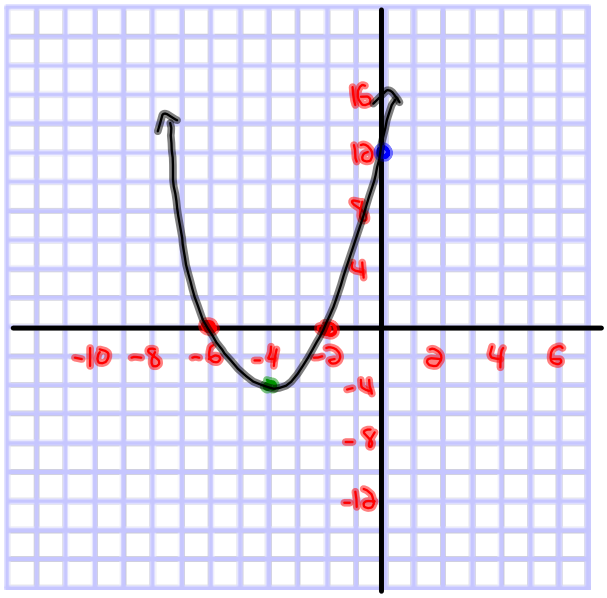
$6 \times 2 = 12$
$6 + 2 = 8$

① x intercepts ($y=0$)

$y = (x+6)(x+2)$

$0 = (x+6)(x+2)$

$x+6=0$	$x+2=0$
$x=-6$	$x=-2$
$(-6,0)$	$(-2,0)$



② y intercept ($x=0$)

$y = x^2 + 8x + 12$

$y = (0)^2 + 8(0) + 12$

$y = 0 + 0 + 12$

$y = 12$

$(0,12)$

③ Stretch

$y = x^2 + 8x + 12$ $\quad a = 1$

positive : opens up

④ Vertex: (complete the Square)

$y = x^2 + 8x + 12$

$y - 12 = x^2 + 8x$ $\quad +16$

$y - 12 = x^2 + 8x + 16$

$y + 4 = (x+4)(x+4)$

$y = (x+4)^2 - 4$

Vertex: $(-4,-4)$

x int

a) **Calculate the roots of the following Quadratic Functions...(Factor)**

b) **Calculate the *y intercept***

c) **Calculate the *vertex***

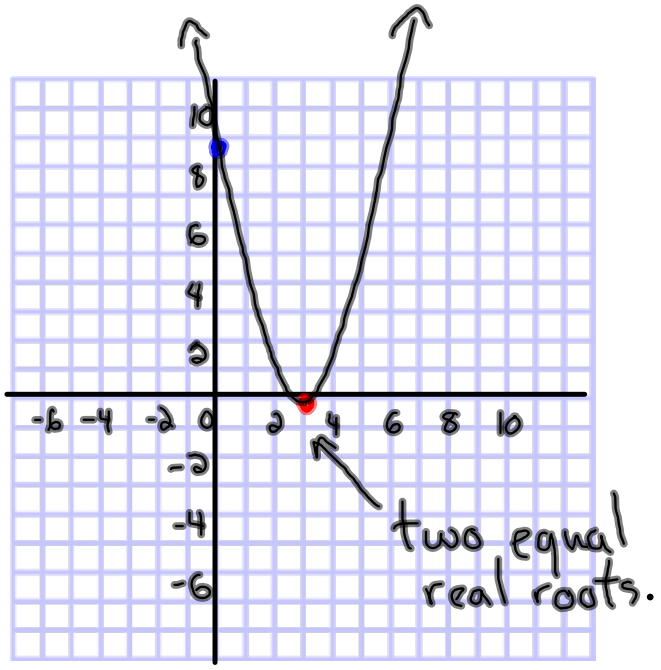
$$y = x^2 - 6x + 9$$

a) Roots (y=0)

$0 = x^2 - 6x + 9$

$0 = (x-3)(x-3)$

$x-3=0$	$x-3=0$
$x=3$	$x=3$



b) y int (x=0)

$y = x^2 - 6x + 9$

$y = (0)^2 - 6(0) + 9$

$y = 9$

c) Vertex (Complete the Square)

$y = x^2 - 6x + 9$

$y - 9 = x^2 - 6x$

$y - 9 + 9 = x^2 - 6x + 9$

$y = (x-3)(x-3)$

$y = (x-3)^2$

$V = (3, 0)$

Calculate the roots of the following Quadratic Functions...(Factor)

$y = x^2 + 5x - 9$ $a=1$ $b=5$ $c=-9$

① x intercepts ($y=0$)

~~*~~ can't factor

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$x = \frac{-(5) \pm \sqrt{(5)^2-4(1)(-9)}}{2(1)}$$

$$x = \frac{-5 \pm \sqrt{25+36}}{2}$$

$$x = \frac{-5 \pm \sqrt{61}}{2}$$

$$x = \frac{-5 \pm 7.8}{2}$$

$$x = \frac{-5+7.8}{2}$$

$$x = \frac{2.8}{2}$$

$$x = 1.4$$

$$x = \frac{-5-7.8}{2}$$

$$x = -12.8$$

$$x = -6.4$$

Homework