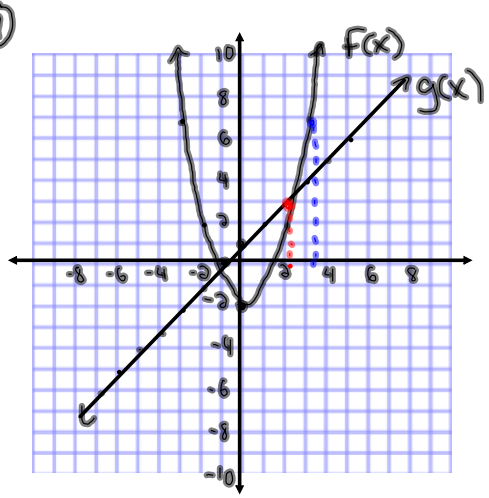
Questions From Homework

⑦



a) $f(g(2))$

$f(3) = 7$

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

⑧ a) $p(q(-2))$

$= p(5)$

$= 0$

③ $f(x) = 3x - 5$ $g(x) = 2 - 5x - x^2$

(f) $(g \circ g)(x)$

$g(g(x))$

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

$= 2 - 10 + 25x + 5x^2 - (x^4 + 10x^3 + 21x^2 - 2x$

$= 2 - 10 + 25x + 5x^2 - x^4 - 10x^3 - 21x^2 + 20x$

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**

$3 - x^2 + 10x^5$ is 5

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

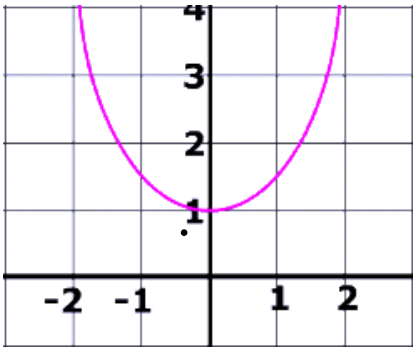
$$y = f(x) = ax^n + bx^{n-1} + cx^{n-2} + \ldots + x^0$$

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 coefficients, 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?*"

x intercepts (Roots) → y=0

y intercepts → x=0

stretch factor "a"

What are the Roots of a Function?

→ x intercepts

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

Calculate the roots of the following Quadratic Functions...(Factor)
Calculate the *y intercept*
Calculate the *vertex*

- x intercept (y=0)

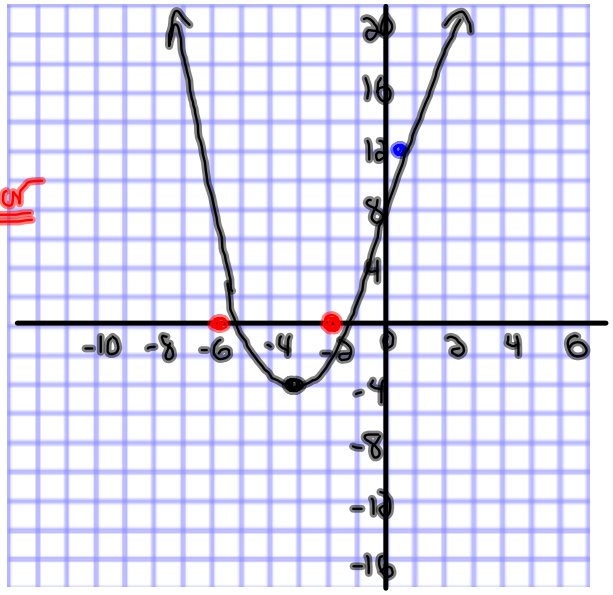
$y = x^2 + 8x + 12$

$0 = x^2 + 8x + 12$

Factor

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

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



- y intercept (x=0)

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

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

$y = 12$

- vertex (complete the square)

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

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

$y - 12 \overset{+16}{} = x^2 + 8x + 16$

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

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

$V = (-4, -4)$

x int

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

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

c) **Calculate the *vertex***

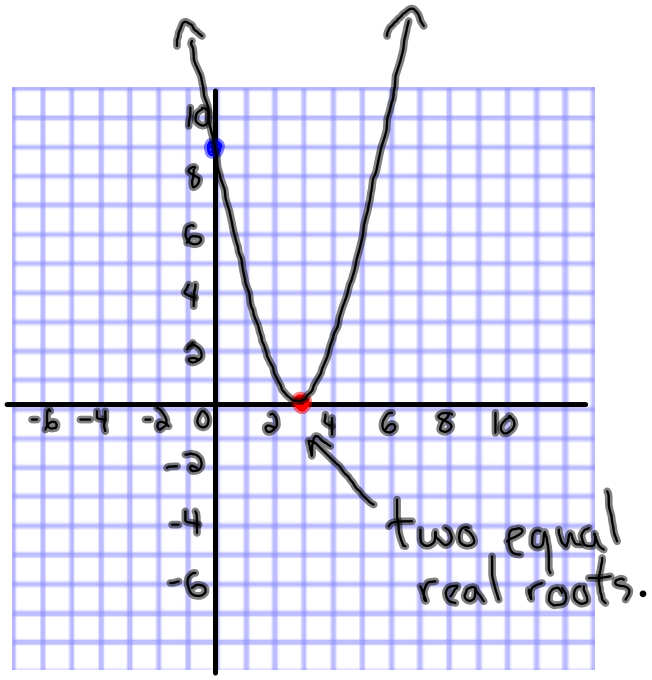
$$y = x^2 - 6x + 9$$

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)

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

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

$+9 \quad +9$

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

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

$y = (x-3)^2$

$V = (3, 0)$

Sketch the following function.

$$y = x^2 + 5x - 9$$

a) Roots ($y=0$)

$0 = x^2 + 5x - 9$

$a=1 \quad b=5 \quad c=-9$

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

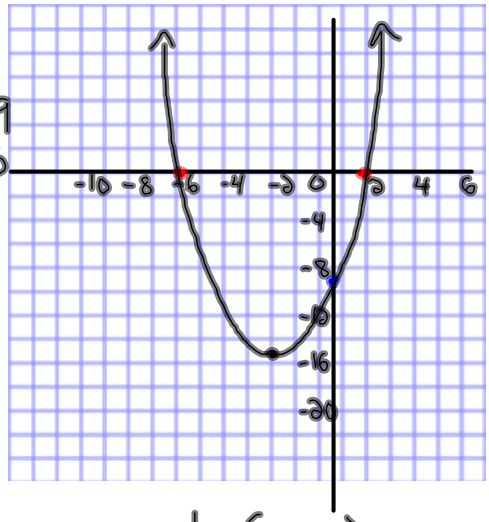
$$x = \frac{-5 \pm \sqrt{(5)^2 - 4(1)(-9)}}{2(1)}$$

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

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

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

$x = \frac{2.8}{2}$	$x = \frac{-12.8}{2}$
$x = 1.4$	$x = -6.4$



b) y int ($x=0$)

$y = x^2 + 5x - 9$

$y = (0)^2 + 5(0) - 9$

$y = -9$

c) Vertex

$y = x^2 + 5x - 9$

$y + 9 \overset{+\frac{25}{4}}{=} x^2 + 5x + \frac{25}{4}$

$y + \frac{36}{4} + \frac{25}{4} = (x + \frac{5}{2})^2$

$y + \frac{61}{4} = (x + \frac{5}{2})^2$

$y = (x + \frac{5}{2})^2 - \frac{61}{4}$

$V = (\frac{-5}{2}, -\frac{61}{4})$

$V = (-2.5, -15.25)$

Homework