Section 2.1 Quadratic Functions and Models

Graph the following quadratics:

$y = 2(x - 3)^2 - 4$

1(2)
3(2)
5(2)
7(2)

V: (3, -4)

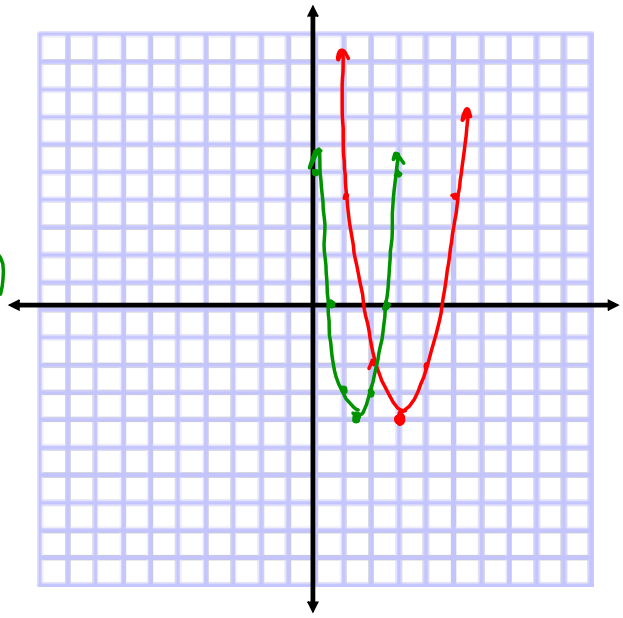
V: (1.5, -4)

$y = (2x - 3)^2 - 4$

up 1 over 1
up 3 over 1
up 5 over 1
up 7 over 1

$2x - 3 = 0$

$\frac{2x}{2} = \frac{3}{2}$



Pull

Graph the following quadratics:

$y = [\frac{1}{2}(x - 3)]^2 - 4$

$y = (\frac{1}{2}x - \frac{3}{2})^2 - 4$

$\frac{1}{2}x = \frac{3}{2}$

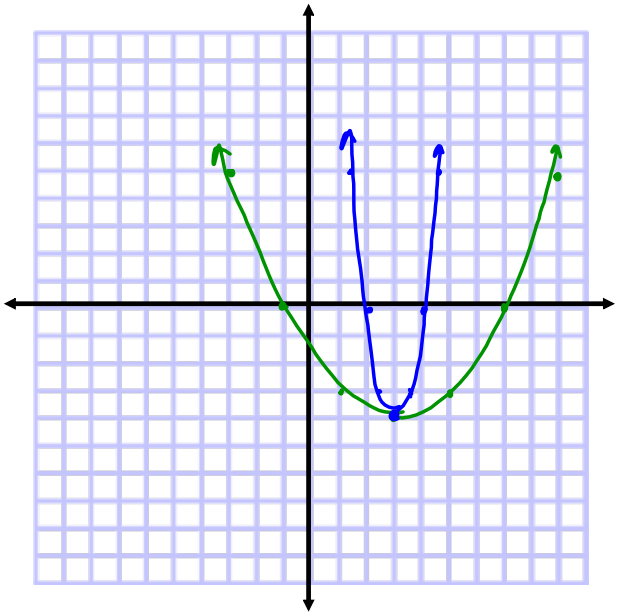
$x = 3$

V: (3, -4)

$y = [2(x - 3)]^2 - 4$

$y = (2x - 6)^2 - 4$

(3, -4)



Pull

Precalculus book refers to vertex form as standard form.

Find the vertex, axis of symmetry and x-intercept(s)

(Matches HW #13-26)

To find the vertex use the axis of symmetry

To find the x-intercept(s) factor or use quadratic formula

Write answer in form $y = a(x - h)^2 + k$

$(x+1)(x+1)$

$f(x) = x^2 + 2x + 1$

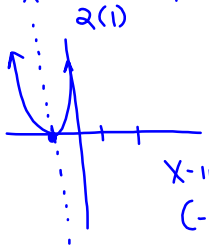
$(x+1)^2$

$x = \frac{-2}{2(1)} = -1$

$(-1, 0)$

$y = (x+1)^2$

$V: (-1, 0)$



x-int

$(-1, 0)$

$y = (x-4)^2 - 16$

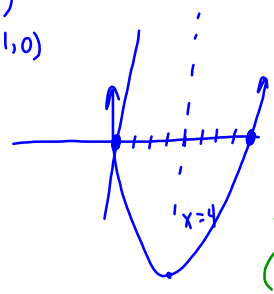
$V: (4, -16)$

$g(x) = x^2 - 8x$

$g(x) = x(x-8)$

x-int:

$(0,0)$ $(8,0)$



$x = \frac{4}{2(-1)} = -2$

$(-2, 5)$

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

$f(x) = -x^2 - 4x + 1$

$-(-2)^2 - 4(-2) + 1$

$x = \frac{4 \pm \sqrt{16 - 4(-1)(1)}}{2(-1)}$

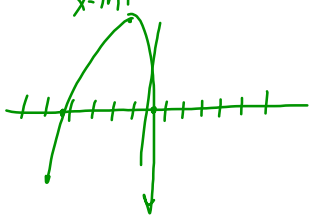
$x = \frac{4 \pm \sqrt{20}}{-2}$

$x = \frac{4 \pm 2\sqrt{5}}{-2}$

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

$(-2 \pm \sqrt{5}, 0)$

x-int



Use a graphing calculator to:

Find the vertex, axis of symmetry and x-intercept(s)

Check algebraically

$16 - 32 + 11$

$f(x) = x^2 + 8x + 11$

$x = \frac{-8 \pm \sqrt{64 - 4(1)(11)}}{2(1)}$

$x = \frac{-8 \pm \sqrt{20}}{2}$

$x = \frac{-8 \pm 2\sqrt{5}}{2}$

$x = -4 \pm \sqrt{5}$

$(-4 \pm \sqrt{5}, 0)$

vertex

$x = \frac{-8}{2(1)} = -4$

$V: (-4, -5)$

A.S. $x = -4$

Write the equation of the quadratic function whose graph is a parabola with the given vertex and that passes through the given point. (Matches HW #37-46)

$y = 2(x+3)^2 - 10$

Vertex: (-3, -10); Point: $(\overset{x}{0}, \overset{y}{8})$

$y = a(x-h)^2 + k$

$y = a(x+3)^2 - 10$

$8 = a(0+3)^2 - 10$

$8 = 9a - 10$

$18 = 9a$

$a = 2$

$y = -\frac{16}{3}\left(x + \frac{5}{2}\right)^2$

Vertex: (-5/2, 0); Point: $(\overset{x}{-7/2}, \overset{y}{-16/3})$

$y = a(x-h)^2 + k$

$y = a\left(x + \frac{5}{2}\right)^2$

$-\frac{16}{3} = a\left(\frac{-7}{2} + \frac{5}{2}\right)^2$

$a = \frac{-16}{3}$

Find the x-intercept(s) of the graph and compare them with the solutions of the corresponding quadratic equation when $f(x) = 0$.

$f(x) = x^2 - 4x$

$0 = x^2 - 4x$

$0 = x(x-4)$

$x = 0, 4$

$(0,0)$ $(4,0)$

$f(x) = 7/10(x^2 + 12x - 45)$

$0 = \frac{7}{10}(x+15)(x-3)$

$x = -15, 3$

$(-15,0)$ $(3,0)$

Find two quadratic functions, one that opens upward and one that opens downward, whose graphs have the given x-intercept(s).

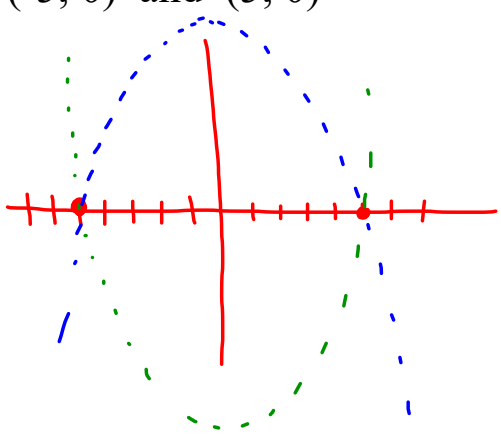
(Many solutions)

$y = -(x-0)^2 + 25$

$y = x^2 - 25$

$f(x) = a(x - p)(x - q)$

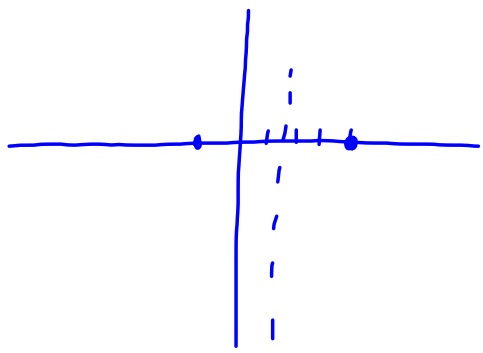
(-5, 0) and (5, 0)



$y = (x+1)(x-4)$

$y = -(x+1)(x-4)$

(-1, 0) and (4, 0)



Section 2.1:

Pgs. 12-122: #3-8, 11, 12, 13-25 odd, 31, 32, 35, 37,
41, 43, 44, 47, 50, 52, 55, 57, 68, 70, 73