

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

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

$$x = \frac{-b}{2a}$$

x coord of vertex

y coord plug x
back into original

Find the vertex and axis of symmetry of the graph of the function. Then rewrite the equation in vertex form.

a) $f(x) = 3x^2 - 6x + 5$ Standard Form

$$a = 3$$

$$b = -6$$

$$c = 5$$

$$x = \frac{-(-6)}{2(3)}$$

$$x = \frac{6}{6} = 1$$

$$y = 3(1)^2 - 6(1) + 5$$

$$y = 2$$

Vertex Form

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

$$y = a(x-1)^2 + k$$

$$y = a(x-1)^2 + 2$$

$$y = 3(x-1)^2 + 2$$

Vertex (1, 2)

Axis of Symmetry: $x = 1$

32) $y = -2x^2 - 7x - 4$

$$x = \frac{-b}{2a}$$

$$a = -2$$

$$b = -7$$

$$c = -4$$

$$x = \frac{-(-7)}{2(-2)} = \frac{-7}{4}$$

$$y = \frac{-2}{1} \left(\frac{-7}{4}\right)^2 - \frac{7}{1} \left(\frac{-7}{4}\right) - 4$$

$$y = \frac{-2}{1} \left(\frac{49}{16}\right) + \frac{49}{4} - 4 = \frac{-98}{16} + \frac{49(4)}{4(4)} - \frac{4(16)}{1(16)}$$

$$= \frac{-98}{16} + \frac{196}{16} - \frac{64}{16}$$

$$= \frac{98}{16} - \frac{64}{16} = \frac{34}{16} = \frac{17}{8}$$

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

vertex (h, k)

Vertex $\left(-\frac{7}{4}, \frac{17}{8}\right)$

A.O.S. $x = -\frac{7}{4}$

$$y = -2\left(x + \frac{7}{4}\right)^2 + \frac{17}{8}$$

Describe each function:

- Opens up/down
- Vertex
- Axis of symmetry
- x-intercepts

x-intercepts

- 1) Factor
- 2) Quad Formula
- 3) Let $y=0$ and do algebra to solve for x

Find x-int

$$-\frac{17}{8} \cdot -\frac{1}{2}$$

Find the vertex and axis of symmetry of the graph of the function without completing the square. Then rewrite the equation in vertex form. Also find the x-intercepts without using the quadratic formula.

a) $f(x) = 3x^2 - 6x + 5$

$$0 = (3x - 1)(x - 5)$$

Not

Factorable ~~$-3x - 5x$~~
 ~~$-15x - 1x$~~

$$y = 3(x-1)^2 + 2$$

Find x-intercepts

Let $y=0$

$$0 = 3(x-1)^2 + 2$$

$$-2 = 3(x-1)^2$$

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

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

No solution
NO x-int

32) $y = -2x^2 - 7x - 4$

$$y = -2\left(x + \frac{7}{4}\right)^2 + \frac{17}{8}$$

$$0 = -2\left(x + \frac{7}{4}\right)^2 + \frac{17}{8}$$

$$\frac{-17}{8} = -2\left(x + \frac{7}{4}\right)^2$$

$$\frac{\left(-\frac{17}{8}\right)}{-2} = \frac{-2\left(x + \frac{7}{4}\right)^2}{-2}$$

$$\sqrt{\frac{17}{16}} = \sqrt{\left(x + \frac{7}{4}\right)^2}$$

$$\pm \frac{\sqrt{17}}{4} = x + \frac{7}{4}$$

$$-\frac{7}{4} \pm \frac{\sqrt{17}}{4} = x$$