

P.S. #11.4b - Review of Quadratic Functions

Name: _____ Class: _____

1.) Consider the function $f(x) = x^2 + 10x + 11$.

a.) Find the vertex by using the equation for the axis of symmetry.

$$X = \frac{-b}{2a} \quad X = \frac{-10}{2(1)} \quad X = -5 \quad f(-5) = (-5)^2 + 10(-5) + 11$$

$$f(-5) = 25 - 50 + 11$$

$$f(-5) = -14$$

$$\boxed{(-5, -14)}$$

b.) Find the vertex by completing the square.

$$f(x) = x^2 + 10x + \boxed{25} + 11 - \boxed{25}$$

$$\left(\frac{10}{2}\right)^2$$

$$\downarrow$$

$$5^2 = 25$$

$$f(x) = (x + 5)^2 - 14$$

$$\boxed{(-5, -14)}$$

2.) Consider the function $f(x) = 3x^2 - 24x - 2$.

a.) Find the vertex by using the equation for the axis of symmetry.

$$X = \frac{-b}{2a} \quad X = \frac{24}{2(3)} = 4$$

$$f(4) = 3(4)^2 - 24(4) - 2$$

$$f(4) = 48 - 96 - 2$$

$$X = 4$$

$$f(4) = -50$$

$$\boxed{(4, -50)}$$

b.) Find the vertex by completing the square.

$$f(x) = 3(x^2 - 8x + 16) - 2 - 48$$

$$\left(\frac{-8}{2}\right)^2$$

$$\downarrow$$

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

$$f(x) = 3(x - 4)^2 - 50$$

$$\boxed{(4, -50)}$$

3.) Consider the function ~~$f(x) = x^2 - 3x + 1$~~ . $f(x) = -4x^2 + 3x + 1$

a.) Find the vertex by using the equation for the axis of symmetry.

$$X = \frac{-b}{2(-4)} = \frac{-3}{-8} \quad X = \frac{3}{8}$$

$$f\left(\frac{3}{8}\right) = -4\left(\frac{3}{8}\right)^2 + 3\left(\frac{3}{8}\right) + 1 = -\frac{9}{16} + \frac{9}{8} + 1 = \frac{25}{16}$$

$$\boxed{\left(\frac{3}{8}, \frac{25}{16}\right)}$$

b.) Find the vertex by completing the square.

$$f(x) = -4\left(x^2 - \frac{3}{4}x + \frac{9}{64}\right) + 1 + \frac{9}{16}$$

$$\left(\frac{-3}{4}\right)^2$$

$$\left(\frac{-3}{8}\right)^2 = \frac{9}{64}$$

$$f(x) = -4\left(x - \frac{3}{8}\right)^2 + \frac{25}{16}$$

$$\boxed{\left(\frac{3}{8}, \frac{25}{16}\right)}$$

4.) Consider the function $f(x) = x^2 + 6x + 2$. Graph the function and identify the key features.
Round the roots to the nearest hundredths.

Axis of Sym:

$$X = \frac{-b}{2a} = \frac{-6}{2(1)} = -3$$

Vertex:

$$f(-3) = (-3)^2 + 6(-3) + 2$$

$$f(-3) = 9 - 18 + 2 = -7$$

$$(-3, -7)$$

Y-int:

$$f(0) = 2$$

Roots:

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

$$0 = x^2 + 6x + \boxed{9} + 2 - \boxed{9}$$

$$\left(\frac{6}{2}\right)^2$$

↓

$$3^2$$

↓

$$9$$

$$0 = (x+3)^2 - 7$$

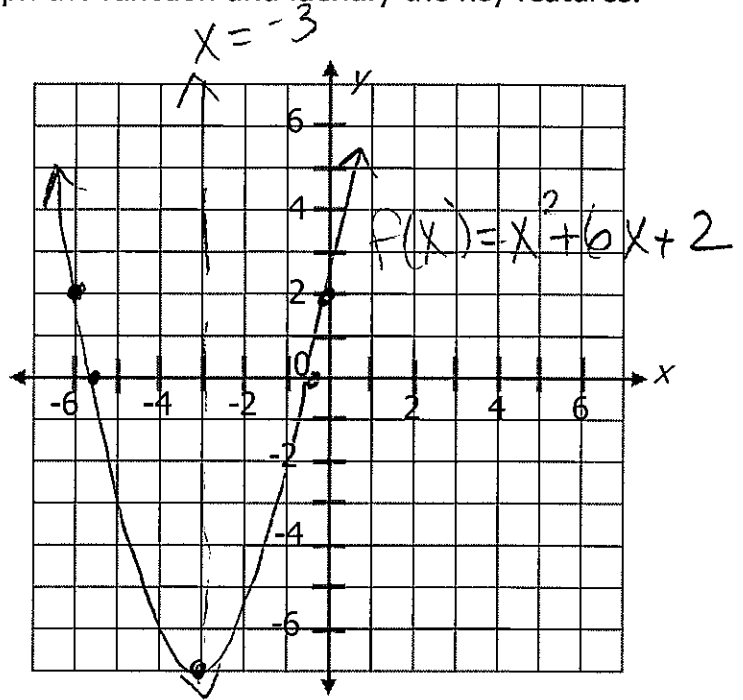
$$7 = (x+3)^2$$

$$\pm\sqrt{7} = x+3$$

$$-3 \pm \sqrt{7} = x$$

$$x = -3 + \sqrt{7} \approx -0.35$$

$$x = -3 - \sqrt{7} \approx -5.65$$



Axis of Symmetry	Vertex	Y-Intercept	Roots
$x = -3$	$(-3, -7)$ -min	$(0, 2)$	$\{-0.35, -5.65\}$