Warm Up 9/18

1. Complete the square: $f(x) = -x^2 + x + 2$

2. Find the vertex by using any method: $5x^2 - 30x + 49$

Warm Up Solutions

$$\left(\frac{b}{2}\right)^2 = (\quad = 1/4$$

1. Complete the square: $f(x) = -x^2 + x + 2$ $\Rightarrow -f(x) = x^2 - x -$

$$\frac{}{-1} \quad \frac{}{-1} \quad \frac{}{-1} \quad \frac{}{-1}$$

$$\Rightarrow \tfrac{1}{4} - f(x) = \left(x^2 - x + 1/4\right) - 2 = \left(x - 1/2\right)^2 - \frac{8}{4} - 1/4$$

$$-1/4$$

$$\Rightarrow -\left(-f(x)\right) = -\left(\left(x - 1/2\right)^2 - 9/4\right) \Rightarrow \boxed{f(x) = -\left(x - 1/2\right)^2 + 9/4}$$

$$\boxed{V: \left(1/2,\ 9/4\right)}$$

Warm Up Solutions

2. Find the vertex by using any method: $5x^2 - 30x + 49$

$\boxed{V: (3, 4)}$

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

$= \frac{30}{2(5)} = 3$

$5(3)^2 - 30(3) + 49$

$45 - 90 + 49 = 4$

Lesson 2-5 Part II

Quadratic Function:
Maxima and Minima

Objective

Students will…

- Be able to find x and y-intercepts, via factoring, quadratic formula, and completing the square.
- Be able to graph quadratic functions by plotting vertex and the intercepts.

Standard form of a Quadratic Function

Recall that the standard form of a quadratic function is:

$g(x) = -3 + 2x + 6x^2$

$f(x) = ax^2 + bx + c,$

$g(x) = 6x^2 + 2x - 3$

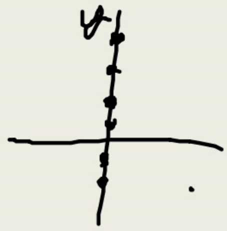
where *a, b,* and *c* are real numbers and $a \neq 0$.

Also, remember that the parabola opens up ("smiley") if $a > 0$, while it opens down ("frowny") if $a < 0$.

Y-intercept

Remember that y-intercept is where the function crosses the y-axis, i.e. when $x = 0$. So, to find the y-intercept simply plug in zero for x and solve. It's good to keep in mind that a parabola will always have exactly one y-intercept.

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



Ex. $f(x) = x^2 - 6x + 8$

y-int: $f(0) = 0^2 - 6(0) + 8$

$= 8$

$\boxed{(0, 8)}$

X-intercept

$3 \pm \frac{\sqrt{14}}{2}$

In contrast, the x-intercepts are where the function crosses the x-axis, i.e. when $y = 0$. So, one must make y, or f(x) in this case, zero and then solve for x. This can be done either by factoring, using the quadratic formula, or completing the square.

Ex.

$f(x) = x^2 - 6x + 8$

8, -4, -2, -6

$0 = x^2 - 6x + 8$

$0 = (x-4)(x-2)$

$x = 4, 2$

$(4,0), (2,0)$

$f(x) = 2x^2 - 12x + 11$

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

$= \frac{12 \pm \sqrt{144 - 4(2)(11)}}{4}$

$\frac{12}{4} \pm \frac{\sqrt{56}}{4}$

Graphing the quadratics

$\frac{6}{2} = 3$

So, once you have the vertex and the x and y-intercepts, you can graph the parabola.

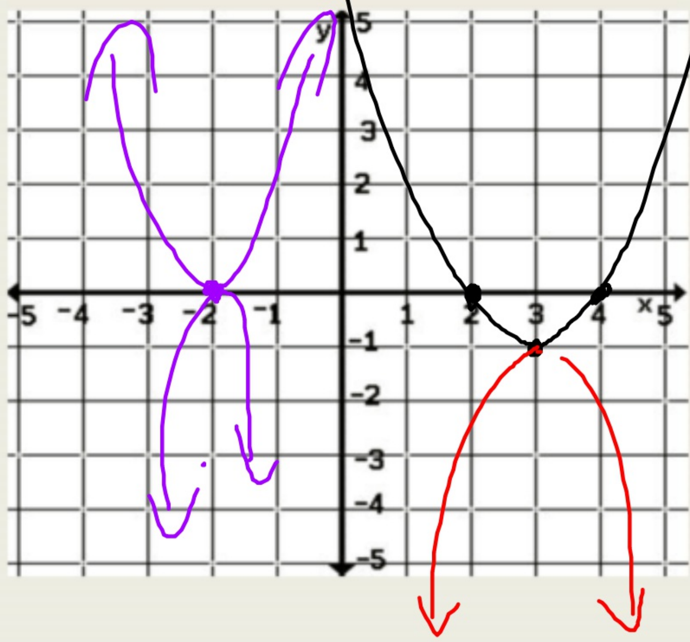
$f(3) = 9 - 18 + 8$

Ex. $f(x) = x^2 - 6x + 8$

y-int: $(0, 8)$

x-int: $(4, 0), (2, 0)$

Vertex: $(3, -1)$



Try a few more...

Graph the following functions

$-8+11$

$x: \frac{-8}{4} = -2 \quad f(-2) = 8 - 16 + 11$

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

$V: (-2, 3)$

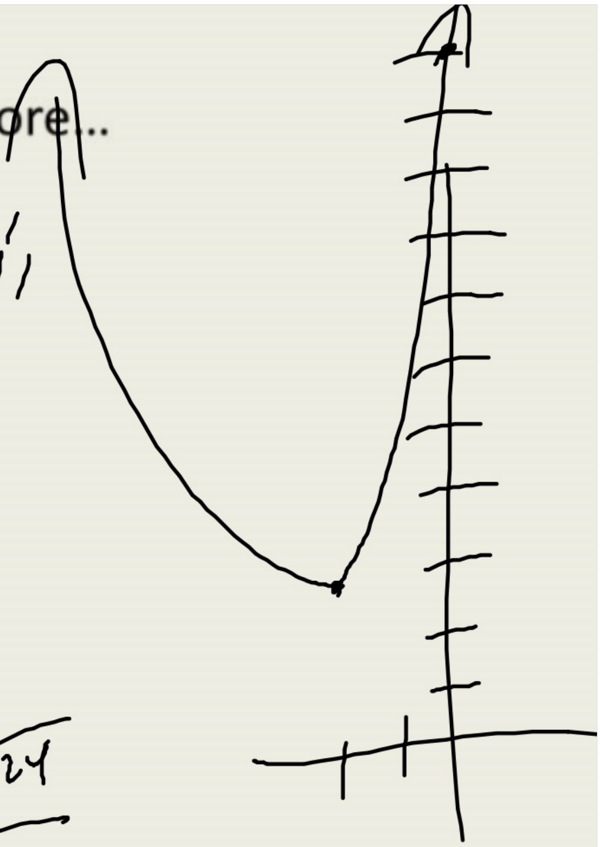
$y\text{-int}: (0, 11)$

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

$= \frac{-8 \pm \sqrt{64 - 88}}{4}$

$= \frac{-8 \pm \sqrt{-24}}{4}$

No x-int



Try a few more…

2. $f(x) = -x^2 + x + 2$

3. $f(x) = 3x^2 + 6x - 1$

Homework 9/18

TB pg. 200-201 #1-17 (E.O.O)

Do all of the parts (a, b, and c).

Remember, you should already have the vertex from previous night.