T-A2 Algebra 2 Week 22 2/20

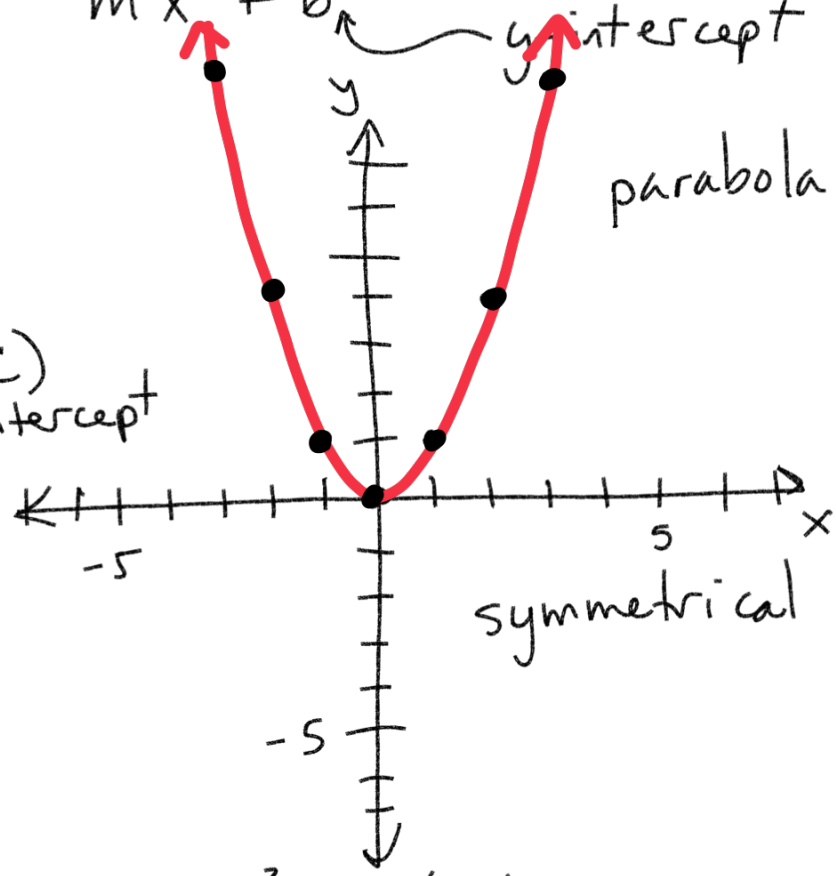
Quadratic function: $\{ ax^{2} + bx + c$

Linear function: $mx + b$ y-intercept

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

$\underline{\underline{x=0}}$ $\cancel{a(0)^2}^{0} + \cancel{b(0)}^{0} + c$

$f(0) = c$ $(0, c)$ y-intercept



Parent function

$f(x) = x^2$

$f(0) = (0)^2 = 0$ $\{(0,0)\}$

$f(1) = (1)^2 = 1$ $(1,1)$

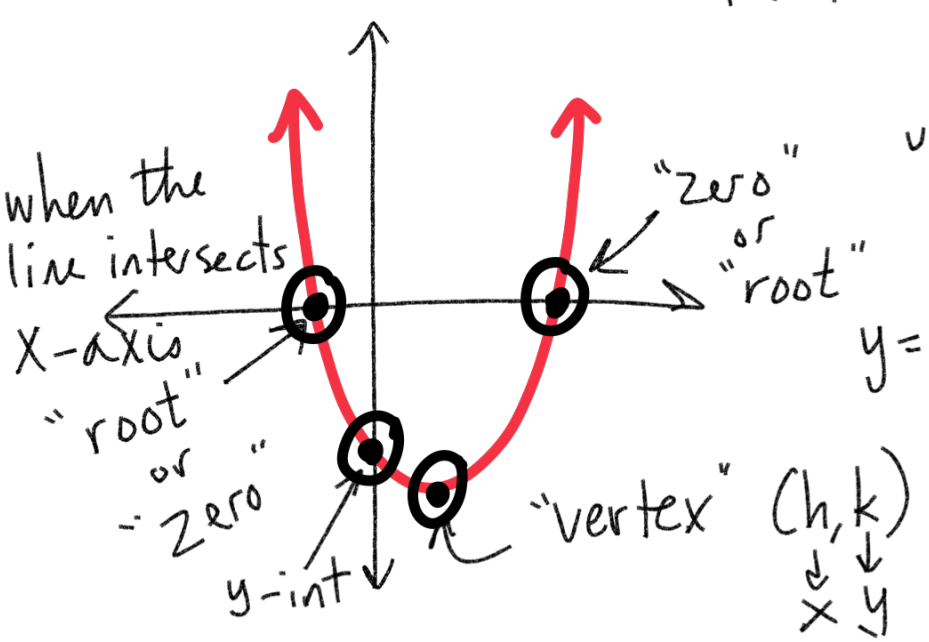
$f(2) = (2)^2 = 4$ $(2,4)$

$f(3) = (3)^2 = 9$ $(3,9)$

$f(-1) = (-1)^2 = 1$ $(-1,1)$

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

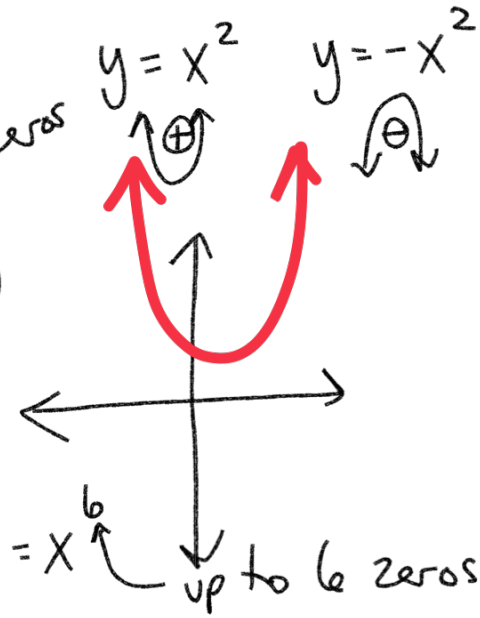
$f(-3) = (-3)^2 = 9$ $(-3,9)$



up to 2 zeros

$y = x^2$

$y = x^{2}$



Quadratic Functions

1.) Must <u>have</u> a "<u>2</u>" as the <u>highest</u> <u>exponent</u>

$y = x^2 + x + 3$ yes, quadratic

$y = x^3 + x^2 - 8$ No, not quadratic

$y = 3x - 7$ No, not quadratic

2.) All exponents on variables must be <u>whole</u> <u>numbers</u>.

$y = x^2 + x^{1/3}$ ← not whole number, not quadratic

$y = x^{-2}$ ← negatives are <u>not</u> whole numbers, not quadratic

Which of the following is a quadratic?

1.) $y = (-5x - 4)(-5x - 4)$

FOIL

First
Outside
Inside
Last

$25x^2 + 20x + 20x + 16$

$25x^2 + 40x + 16$ $\quad ax^2 + bx + c$

yes, quadratic

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

$3x - 3 + 3 = 3x \rightarrow$ naw!

3.) $y = \cancel{x^2} - 11x + 24 - \cancel{x^2}$ $\quad -11x + 24 \rightarrow$ naw!

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

$3^2 = 3 \cdot 3$

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

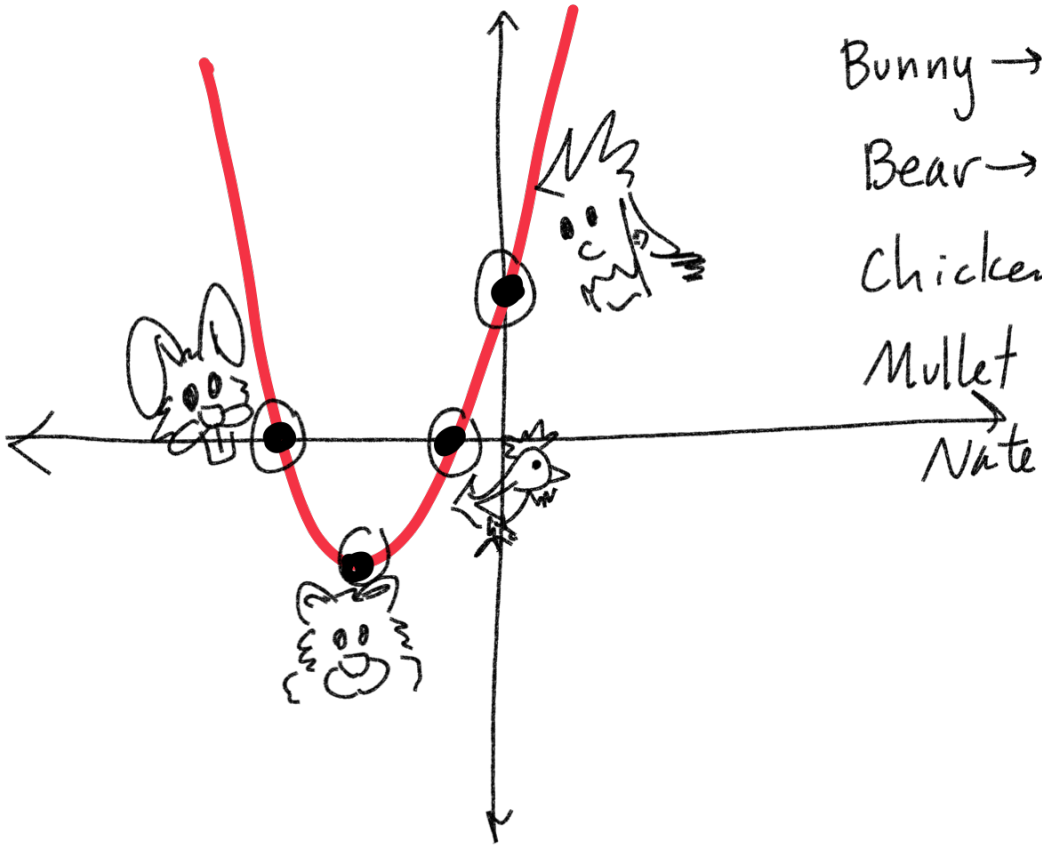
FOIL $2(x+2)(x+2) - 2x^2$

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

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

$\cancel{2x^2} + 8x + 8 \cancel{- 2x^2}$

$8x + 8 \longrightarrow$ naw!



Bunny → "zero", "root"

Bear → "vertex"

Chicken → "zero", "root"

Mullet → y-int

Quadratic Function

$y = ax^2 + bx + c$

$(-1, 2)$ $(1, 2)$ $(3, 10)$

x y x y x y

$x = -1 \quad y = 2$

$y = ax^2 + bx + c$

$2 = a(-1)^2 + b(-1) + c$

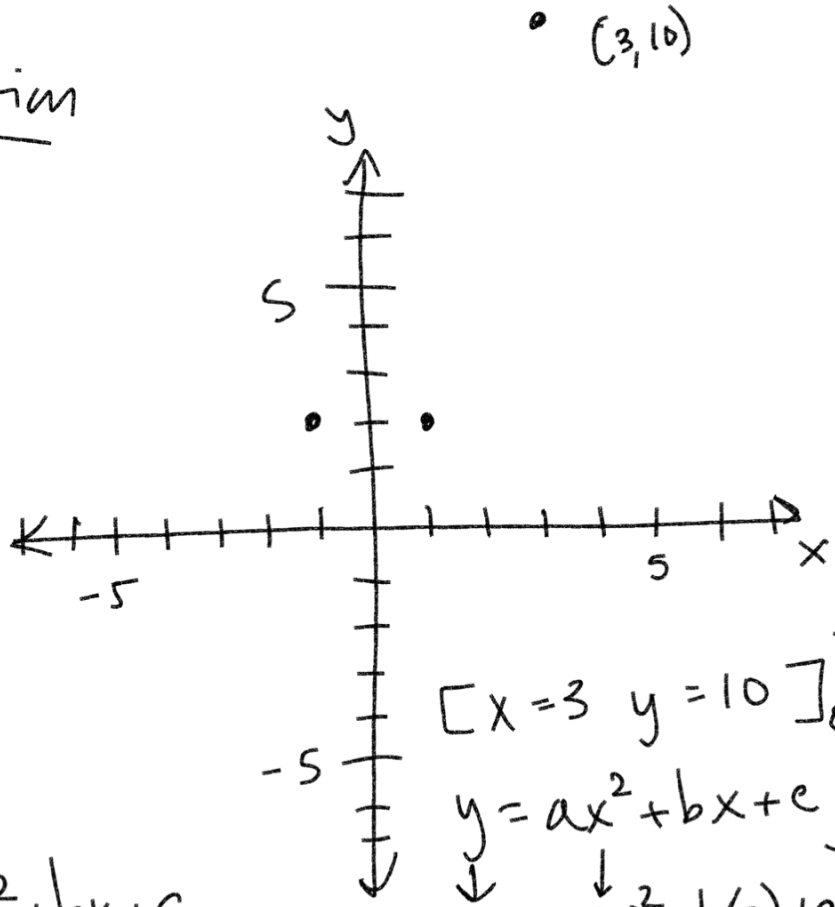
1 $2 = a - b + c$

$[x = 1 \quad y = 2]$

$y = ax^2 + bx + c$

$2 = a(1)^2 + b(1) + c$

2 $2 = a + b + c$



$[x = 3 \quad y = 10]$

$y = ax^2 + bx + c$

$10 = a(3)^2 + b(3) + c$

3 $10 = 9a + 3b + c$

① $a - b + c = 2$

② $a + b + c = 2$

③ $9a + 3b + c = 10$

① $a - b + c = 2$

② $-1(a + b + c = 2)$

$$\begin{array}{rl} & \cancel{a} - b + \cancel{c} = \cancel{2} \\ + & \cancel{-a} - b \cancel{-c} = \cancel{-2} \\ \hline & -2b = 0 \\ & \frac{-2b}{-2} = \frac{0}{-2} \end{array}$$

$$\boxed{b = 0}$$

$b = 0$

① $a + c = 2$

② $a + c = 2$

③ $9a + c = 10$

$$\begin{array}{rl} & a + c = 2 \\ -1(& 9a + c = 10) \end{array}$$

$$\begin{array}{rl} & a + \cancel{c} = 2 \\ & -9a - \cancel{c} = -10 \\ \hline & -8a = -8 \\ & \frac{-8a}{-8} = \frac{-8}{-8} \end{array}$$

$$\boxed{a = 1}$$

$a + c = 2$

$1 + c = 2$

$-1 \qquad -1$

$$\boxed{c = 1}$$

$a = 1 \quad b = 0 \quad c = 1$

$$ax^2 + \cancel{b}^{\,0}x + c = y$$

$$\boxed{x^2 + 1 = y}$$