M-A2 Algebra 2 Week 22 3/4

Quadratic function: $y = ax^2 + bx + c$ (slope: a; y-intercept: c)

Linear functions: $y = mx + b$ (m: slope; b: y-intercept)

$f(x) = x^2$

<u>Parent function</u>

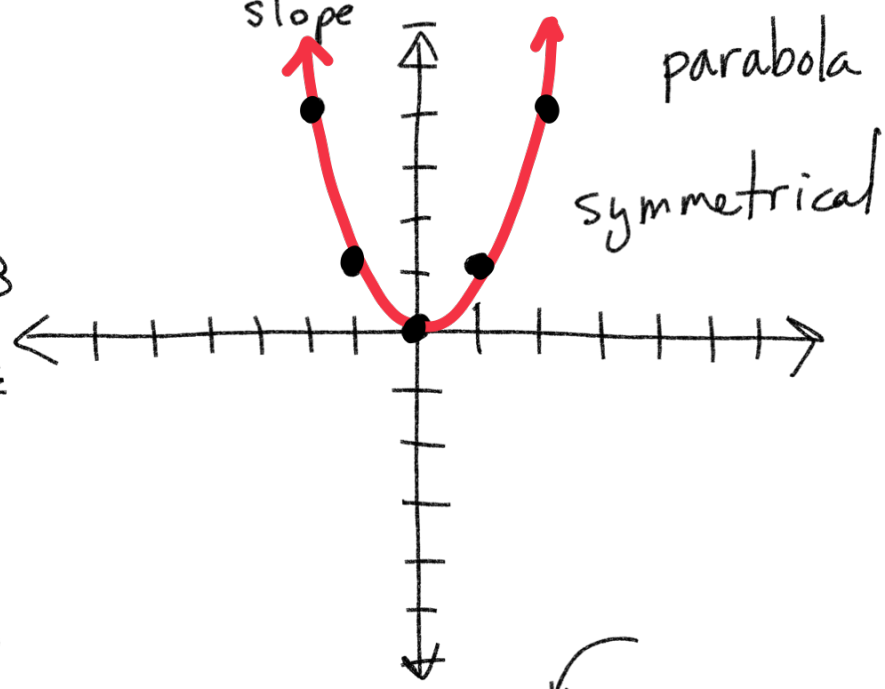
$f(0) = (0)^2 = 0$ $\{(0, 0)\}$

$f(1) = (1)^2 = 1$ $\{(1, 1)\}$

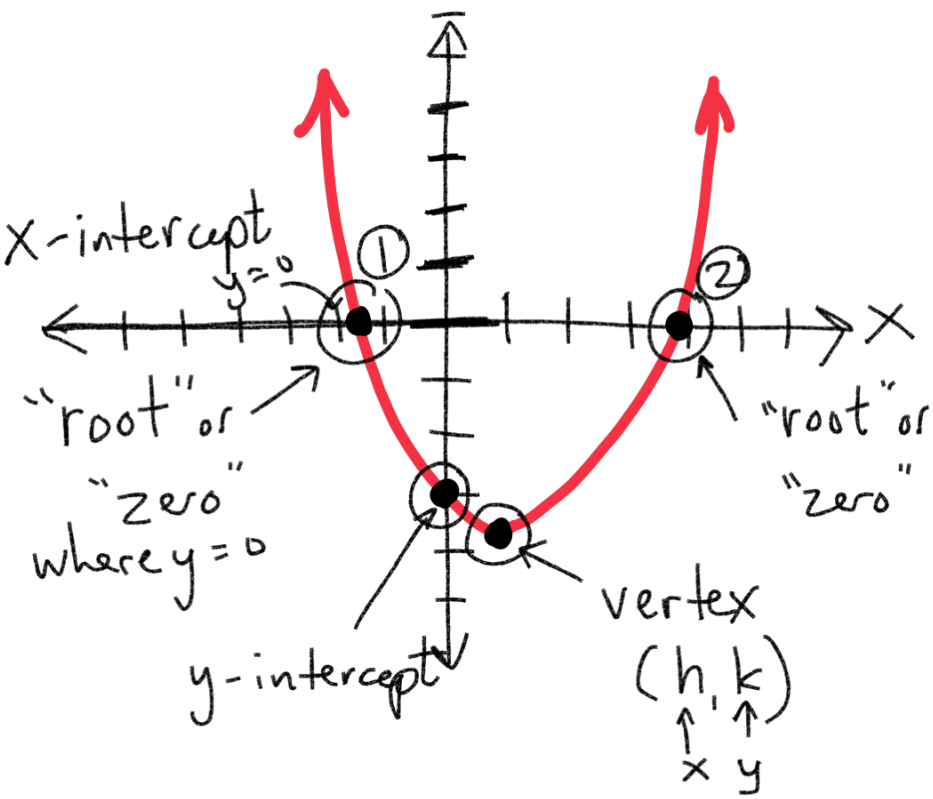
$f(2) = (2)^2 = 4$ $(2, 4)$

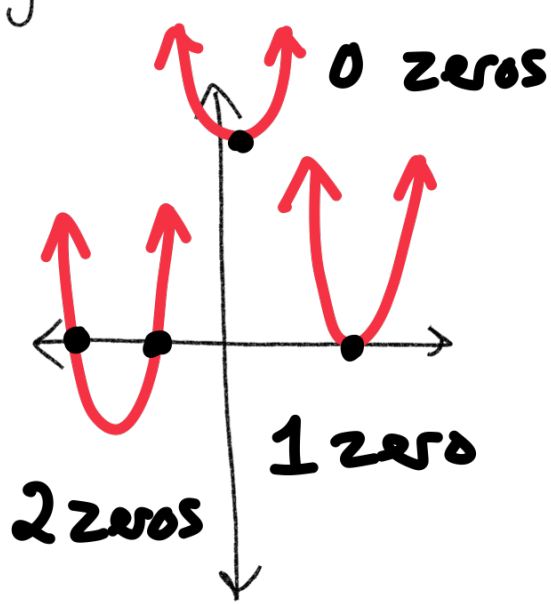
$f(-1) = (-1)^2 = 1$ $(-1, 1)$

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



$y = ax^2 + bx + c$





Quadratic Functions

1.) Must have a "2" as the highest exponent. x^2

$y = x^2 + x + 3$ yaw! quadratic

$y = x^3 + x^2 - 8$ naw!

$y = 3x - 7$ naw!

2.) All exponents on variables must be whole numbers. no fractions

$y = x^2 + x^{1/3}$ naw!

no negatives

$y = x^{-2}$ naw!

Which of the following is a quadratic?

1.) $y = (-5x-4)(-5x-4)$ F O I L

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

F O I L

$25x^2 + 40x + 16$ yaw!

First
Outside
Inside
Last

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

$3x - 3 + 3 = \boxed{3x}$ Naw!

$x \cdot x = x^2$

$-5x \cdot (-5x)$

$25x^2$

3.) $y = \boxed{\cancel{x^2}} - 11x + 24 \boxed{\cancel{-x^2}} = -11x + 24$ Naw!

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

$(x+2)^2 \neq x^2 + 2^2$

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

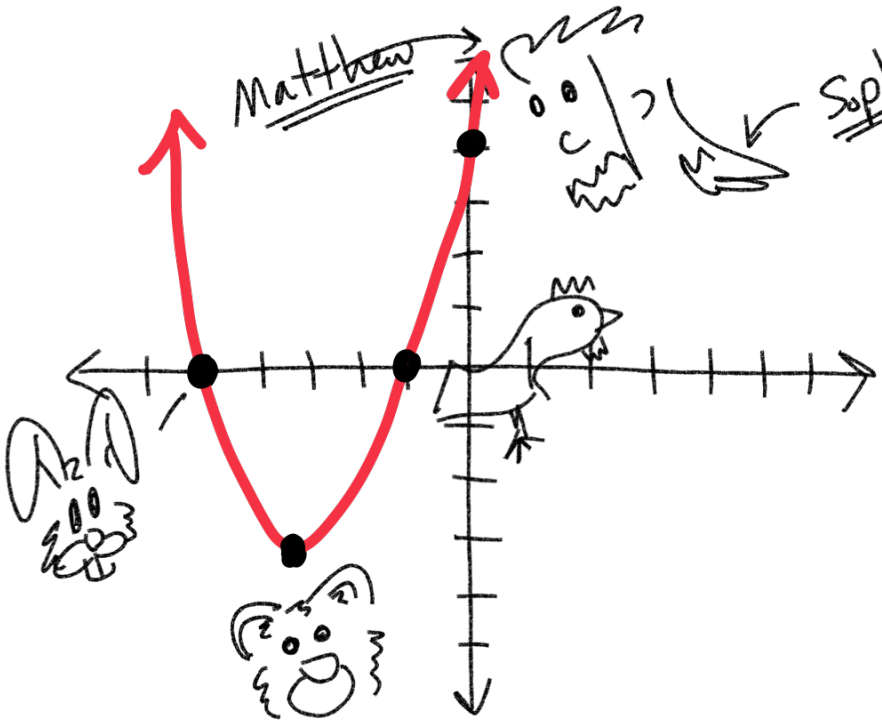
$2(x+2)(x+2) - 2x^2$

FOIL

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

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

$\cancel{2x^2} + 8x + 8 \cancel{-2x^2} = 8x + 8$ Naw!



Bunny → zero, root

Bear → vertex

Chicken → zero, root

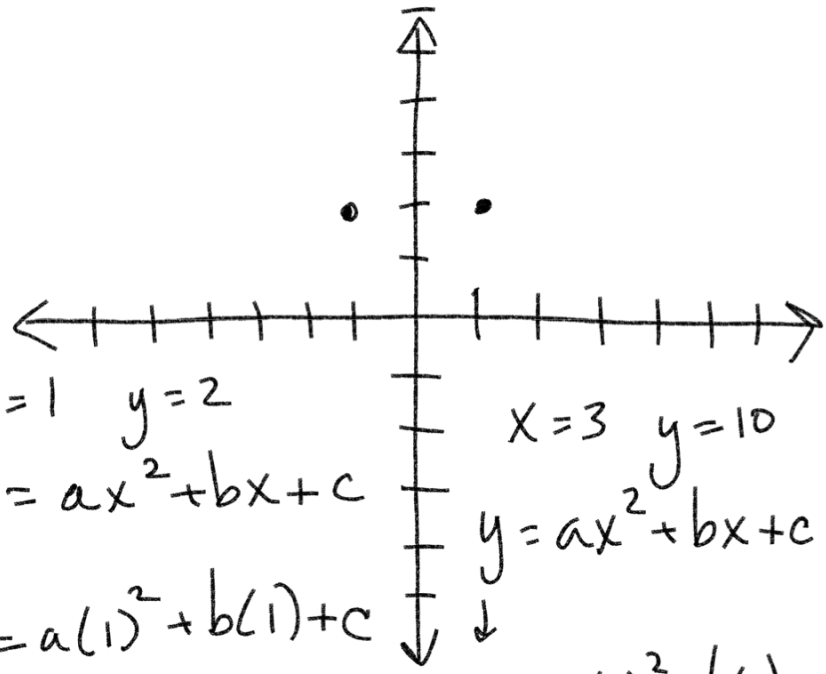
Mullet Nate → y-int

Quadratic Function

$$y = ax^2 + bx + c$$

① ② ③

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



$x=-1 \quad y=2$

$y = ax^2 + bx + c$

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

$2 = a - b + c$

$x=1 \quad y=2$

$y = ax^2 + bx + c$

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

$2 = a + b + c$

$x=3 \quad y=10$

$y = ax^2 + bx + c$

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

$10 = 9a + 3b + c$

$$2 = a - b + c$$
$$2 = a + b + c$$
$$10 = 9a + 3b + c$$

① $2 = a - b + c$

② $2 = a + b + c$

③ $10 = 9a + 3b + c$

① $2 = a - b + c$

② $-(2 = a + b + c)$

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

$$\frac{0}{-2} = \frac{-2b}{-2} \qquad \boxed{b = 0}$$

① $2 = a + c$

② $2 = a + c$

③ $10 = 9a + c$

③ $10 = 9a + c$

① $-(2 = a + c)$

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

$$\frac{8}{8} = \frac{8a}{8}$$

$$\boxed{1 = a}$$

$2 = a + c$

$\downarrow$

$2 = 1 + c$

$-1 \quad -1$

$$\boxed{1 = c}$$

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

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