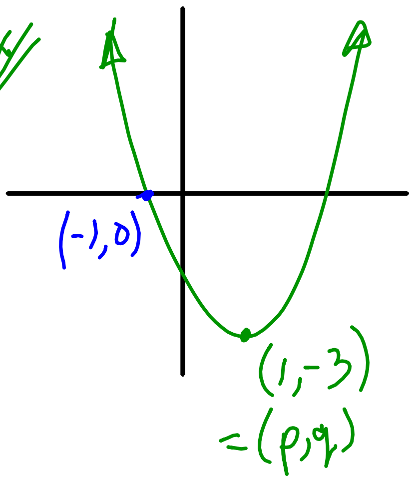
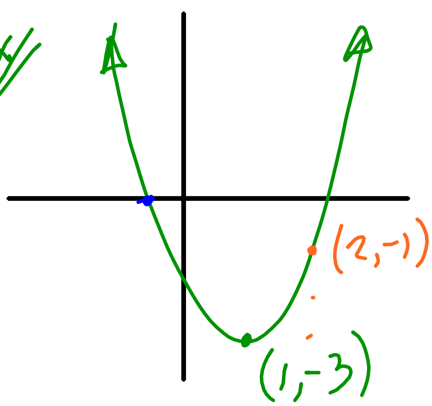
$$y = a(x-p)^2 + q \Rightarrow v(p,q)$$

ex

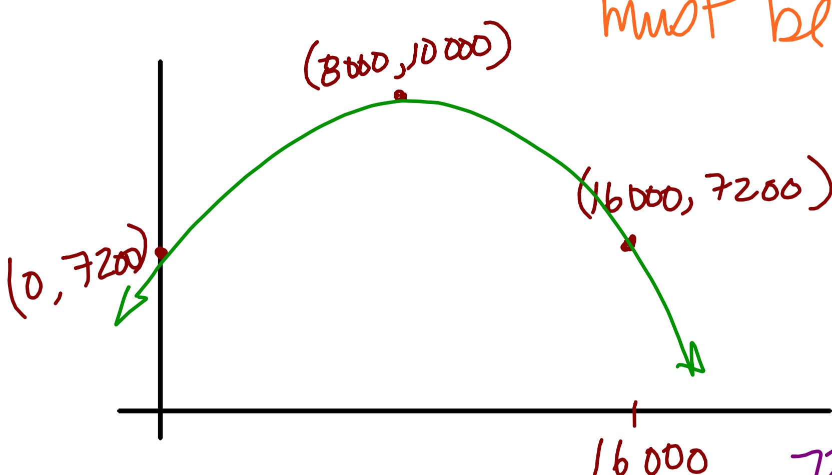


$$y = a(x-1)^2 + (-3)$$
$$y = a(x-1)^2 - 3$$
$$0 = a(-1-1)^2 - 3$$
$$0 = 4a - 3$$
$$\frac{3}{4} = \frac{4a}{4} \Rightarrow y = \frac{3}{4}(x-1)^2 - 3$$

ex



in this case, I see that from the vertex I move right one and up 2 so the "a" value must be 2



$$y = a(x-8000)^2 + 10000$$

sub in (0,7200)

$$7200 = a(0-8000)^2 + 10000$$

solve for a

3.2 Quadratic Functions in General Form

* A quadratic function is in general form when it looks like this:

$$f(x) = ax^2 + bx + c \, , \quad (a \neq 0)$$

same

compare... $f(x) = a(x-p)^2 + q$ (vertex form)

* When a quadratic function is in general form we can identify the following properties.

- direction of opening given by "a" (same as vertex form)
- y-intercept: $f(0) = c$ (the constant term)
- axis of symmetry: $\boxed{x = -\frac{b}{2a}}$ also... b = slope of tangent @ y-int.
- vertex coordinates
  (x_v, y_v) with $\boxed{x_v = \frac{-b}{2a}}$ $\rightarrow$ find $f(x_v) = y_v$

ex. $y = 2x^2 - 12x + 25$

$a = 2$: (opens up)

y-int.: $(0, 25)$

AOS: $x = \frac{-(-12)}{2(2)}$

$\boxed{x = 3}$

* sub $x_v = 3$ into eqn

$y_v = 2(3)^2 - 12(3) + 25$

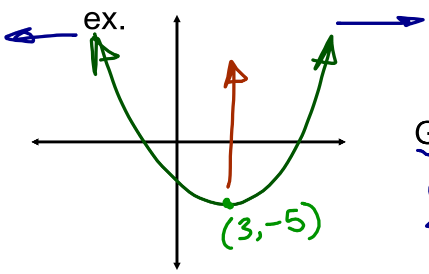
$y_v = 18 - 36 + 25$

$y_v = 7 \Rightarrow$ vertex $(3, 7)$

* the domain of a function is the set of all possible x values

* the range of a function is the set of all possible y values

ex.



range $= \{y \in \mathbb{R}, y \geq -5\}$

Generally, the domain of a quadratic function is:

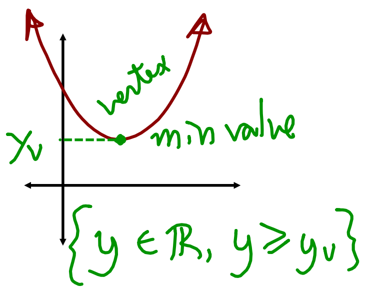
$\{x \in \mathbb{R}\}$ "x is an element of the real number set"

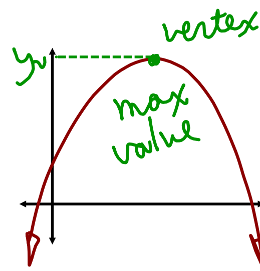
However, in "real-world" models, we often have to restrict the domain to suite the problem.

ex// Since we can't produce negative items maybe $\{x \in W, x \geq 0\}$

whole numbers

* The range of a function depends on its direction of opening.





$\{y \in \mathbb{R} \mid y \leq y_v\}$

x-intercepts

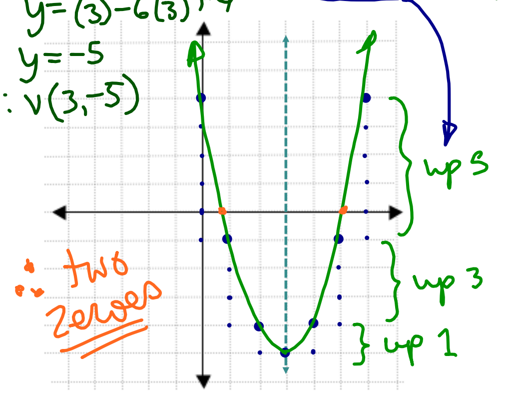
* As with quadratic functions in ANY form, the number of zeroes depends on the direction of open and the position of its vertex.

AOS: $x = \frac{-b}{2a} = -\frac{(-6)}{2(1)} = 3$

AOS: $x = \frac{-(-2)}{2(1)}$
$= 1$

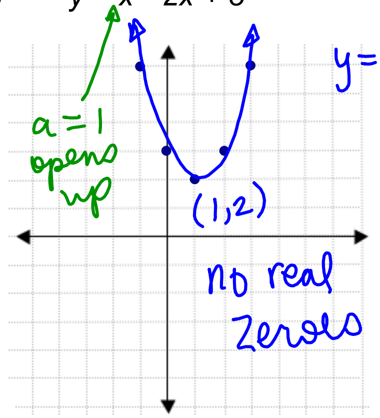
ex. $y = x^2 - 6x + 4$ $\boxed{a = 1} \Rightarrow$ up

$y = (3)^2 - 6(3) + 4$
$y = -5$
$\therefore v(3, -5)$



$y = x^2 - 2x + 3$

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



* With a graphing calculator, we can graph any function...

① $\boxed{y=}$ $2x^2 - 3x + 4$ $\boxed{x, T, \theta, n}$

② $\boxed{\text{graph}}$

③ window → (set domain and range)

Homefun: pg. 174 #1-5, 7-10, 12, 15, 18, 20, 23

hint: $\boxed{\text{zoom}}$ → 6: standard

gives $-10 \leq x \leq 10$
$-10 \leq y \leq 10$

x	y	
0	0	>1
1	1	>3
2	4	>5
3	9	

$y = 1x^2$