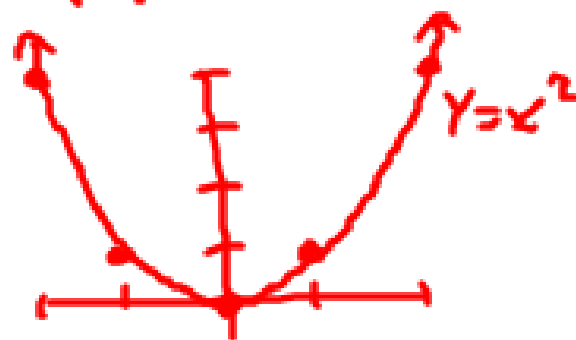


### 3.1 Quadratics: vertex form

$$f(x) = a(x-p)^2 + q$$

\* basic quadratic  $y = x^2$

x	y
-2	4
-1	1
0	0
1	1
2	4



\* vertex  $(p, q)$

\* if  $a > 0$  concave up  
if  $a < 0$  concave down

\* axis of symmetry  
 $x = p$

\*  $p$ : horizontal translation

\*  $q$ : vertical translation

ex 1 pg 148  $y = 2(x+1)^2 - 3$

vertex?  $(-1, -3)$

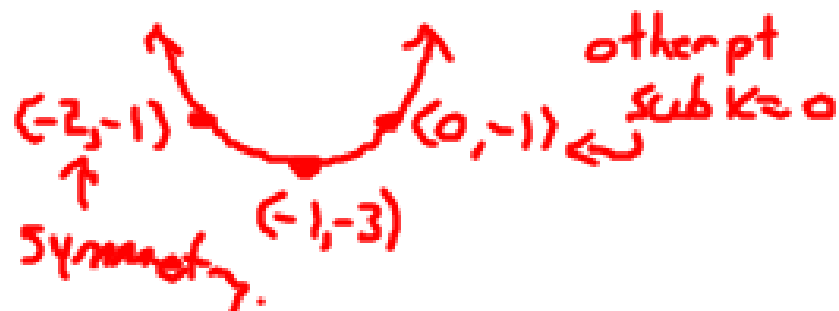
axis  $x = -1$

concave up

minimum of  $y = -3$

domain  $x \in \mathbb{R}$

range  $y \in \mathbb{R} \mid y \geq -3$



ex 2 pg 151 find equation given vertex (5, -4) and another point (2, -1)

$$y = a(x - p)^2 + q$$

$$y = a(x - 5)^2 - 4$$

(sub 2, -1)

$$-1 = a(2 - 5)^2 - 4$$

$$3 = a(-3)^2$$

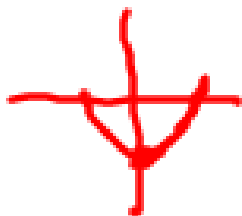
$$3 = 9a$$

$$\frac{1}{3} = a$$

$$y = \frac{1}{3}(x - 5)^2 - 4$$

ex 3 how many x intercepts?

a)  $y = 0.8x^2 - 3$   
vertex  $(0, -3)$   
concave up



2 x-int

b)  $f(x) = 2(x-1)^2$   
vertex  $(1, 0)$   
concave up



1 x-int

c)  $y = -3(x+2)^2 - 1$   
vertex  $(-2, -1)$   
concave down



0 x-int

4c, 4d  
7, 8, 9, 10  
15, 17, 21  
pgs 157-161