Class # 24 - Tues, Oct. 26

- Quiz #3 - due Friday, 5pm.
  - discuss at end of class.
- Midterm grades - next week.

- WebWork : 3 "Parabola" WW sets due Monday.

Today

(1) Finish up "parabolas" (graphs of quadratic functions $y = ax^2 + bx + c$.)

(2) Distance formula $\Rightarrow$ equation of circles.

Review: graphs of quadratic polynomials

"parabolas"

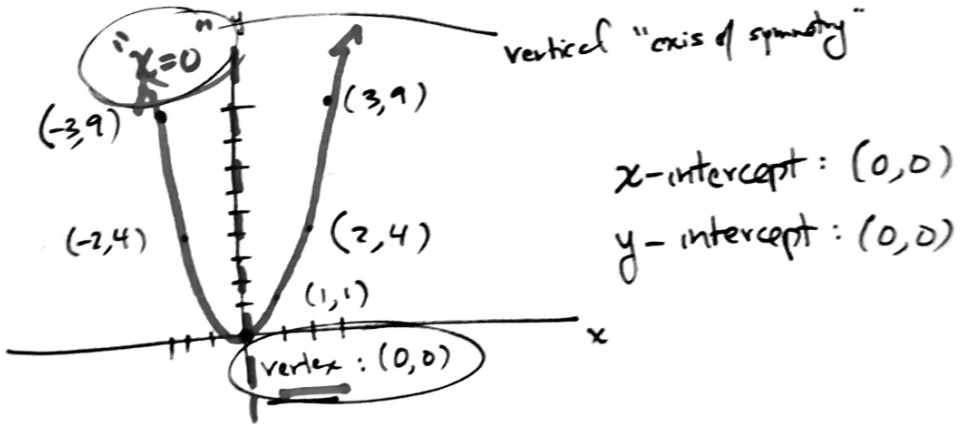
$y = ax^2 + bx + c$.

Ex: Let's go back & look at the simplest, most basic quadratic polynomial.

$$y = x^2$$

What does the graph of "$y = x^2$" look like?

x	y	(x, y)
0	$y = 0^2 = 0$	$(0,0)$
1		$(2,4)$
2		
3	$y = 3^2 = 9$	$(3,9)$
-3	$y = (-3)^2 = 9$	$(-3,9)$



x-intercept : (0,0)

y-intercept : (0,0)

Parabolas: vertical and/or horizontal "shifts"

("Shifting Parabolas" - WebWork)

§9.7 "transformations"

"shift" basic parabola $y = x^2$

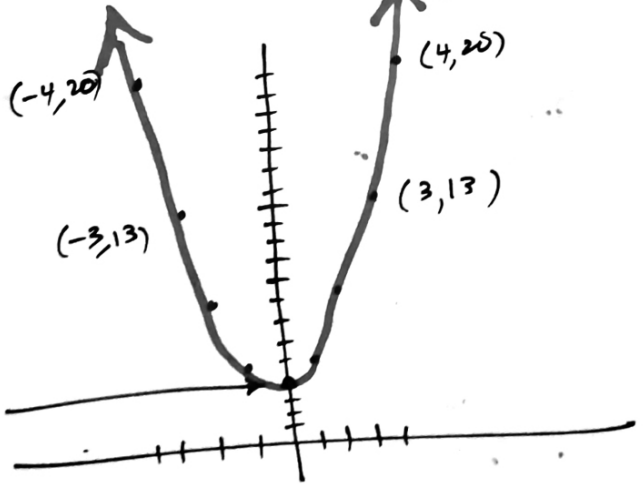
vertical shifts

(1) $y = x^2 + k$ (where k is any constant #)

Ex: Graph $y = x^2 + 4$

Table of (x, y) pts

x	$y = x^2$	$y = x^2 + 4$
0	0	4
±1	1	5
±2	4	8
±3	9	13
±4	16	20
±5	25	29
±6	36	40



vertex? (0,4)

Oper-stat: 9.54

Example 9.53

(2) Horizontal shifts (of $y = x^2$)

$\Rightarrow$ algebraically: $y = (x-h)^2$

($\Rightarrow y = (x-h)(x-h)$

$= x^2 - xh - xh + h^2$

$= x^2 - 2xh + h^2$

very different from $y = x^2 + k$)

horizontal shift by h units.

Ex: (See OpenStax Ex 9.55/9.56)

$y = (x-1)^2$: $y = x^2$ shifted right 1 unit

$y = (x+1)^2$: $y = x^2$ shifted left 1 unit

$y = (x-6)^2$

Ex : $y = (x-h)^2$ where $h < 0$

$h = -3 \Rightarrow$ horizontal shift left (of $y = x^2$) by 3 units

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

$y = (x+3)^2$