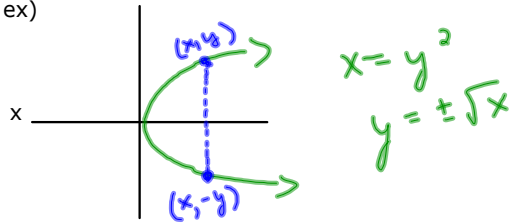


Chap 3 Symmetry

x-axis sym:

-- reflects vertically across the x-axis  
ex)



\*\*\* These are NOT Functions !!! \*\*\*

-- if the point  $(x,y)$  is on the graph, then  $(x,-y)$  is also on the graph.

-- to check for x-axis symmetry, replace "y" with "-y" and the eqn will remain the same.

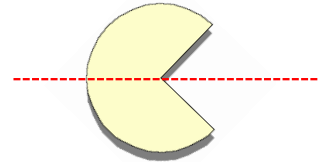
ex1)  $3x + y^2 = 17$   
 $3x + (-y)^2 = 17 \rightarrow 3x + y^2 = 17$   
 x-axis sym.

ex2)  $x = |y| + 3$   
 $x = |-y| + 3 \rightarrow x = |y| + 3$   
 x-axis sym

ex3)  $y^4 - 3x^2 + 7x - 5y^2 + 2 = 0$

Nov 2-8:45 PM

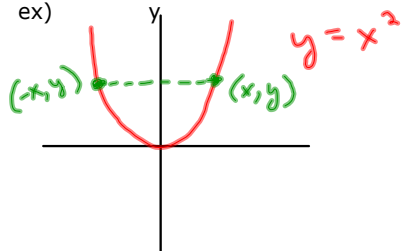
x-axis sym.



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**y-axis sym:**

-- reflects horizontally across the y-axis  
ex)



\*\*\* These are called **EVEN** Functions, if the equation is a function. \*\*\*

-- if the point  $(x,y)$  is on the graph, then  $(-x,y)$  is also on the graph.

-- to check for y-axis symmetry, replace "x" with "-x" and the eqn will remain the same.

ex1)  $3x^2 + 5y = 7$   
 $3(-x)^2 + 5y = 7 \rightarrow 3x^2 + 5y = 7$   
 y-axis

ex2)  $2y = |4x| + 3$   
 $2y = |4(-x)| + 3 \rightarrow 2y = |4x| + 3$   
 y-axis

ex3)  $y - 3x^2 + 7x^6 - 5y^2 + 2 = 0$

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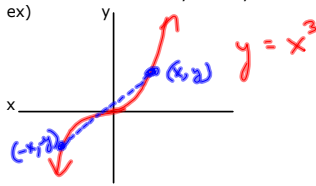
Y-axis Sym.



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**origin sym:**

- reflects diagonally through the origin
- also called "rotational symmetry"



\*\*\* These are called **ODD** Functions, if the equation is a function. \*\*\*

- if the point (x,y) is on the graph, then (-x,-y) is also on the graph.

- to check for origin symmetry, replace "x & y" with "-x & -y" and the eqn will remain the same.

ex1)  $3x^2 + y^2 = 1$  All 3 types origin  
 $3(-x)^2 + (-y)^2 = 1 \rightarrow 3x^2 + y^2 = 1$

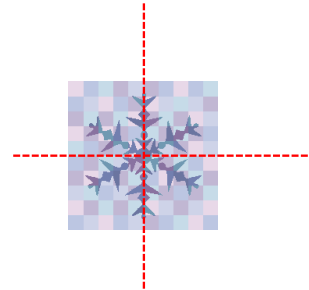
ex2)  $x^2 = |y| + 3$   
All 3 types

ex3)  $y^4 - 3x^2 + 7|x| - 5y^2 + 2 = 0$   
All 3 types

ex4)  $y = 5x^3$   
 $(-y) = 5(-x)^3$   
 $-y = -5x^3$   
 $y = 5x^3$  origin

Nov 2-8:53 PM

origin sym



Nov 2-9:00 PM

\*\* Graphs can have all 3 types of symmetry,

but they **Cannot** have exactly 2 types.

If a graph has x & y symmetry, then it automatically has origin symmetry.

Nov 2-9:36 PM