Section 1-6
Reflections, Absolute Values and Even/Odd Functions

Reflection
across y-axis
- substitute –x for x in equation or f(-x)

across x-axis
- multiply whole equation by -1 or y = - f(x)

$f(x) = x^2 - 8x + 17$ where $2 \leq x \leq 5$

a. Write an equation for the reflection of the pre-image across the y-axis

making 'x' neg

$f(-x) = (-x)^2 - 8(-x) + 17$ * graph to confirm

$f(-x) = x^2 + 8x + 17$

b. Write an equation for the reflection of the pre-image across the x-axis

making 'y' neg

$-f(x) = x^2 - 8x + 17$

$f(x) = -x^2 + 8x - 17$

Any function having the property f(-x) = f(x) is called an **even function.

$f(x) = -x^4 + 5x^2 - 1$ $f(-x) = -(-x)^4 + 5(-x)^2 - 1$

$f(-x) = -x^4 + 5x^2 - 1$

* they are the same

$f(-x) = f(x)$, which means function is even.

Even functions reflect across the y-axis.

Any function having the property f(-x) = -f(x) is called an **odd function.

$f(x) = -x^3 + 6x$ $f(-x) = -(-x)^3 + 6(-x)$

$f(-x) = x^3 - 6x$

* they are opp.

$f(-x) = -f(x)$, which means function is odd.

Odd functions reflect across the origin.

Absolute Value Transformations:

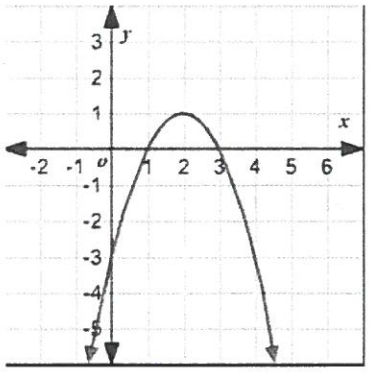
$g(x) = | f(x) |$

- all values below x-axis are flipped up over x-axis
- all values above x-axis remain the same on new graph

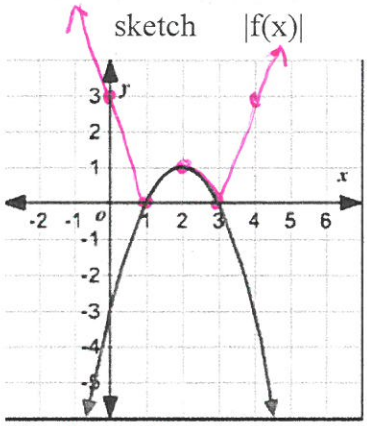
$g(x) = f(|x|)$

- all positive x values stay the same **and** get reflected over the y-axis
- any negative x value parts get eliminated from the new graph

Given f(x)

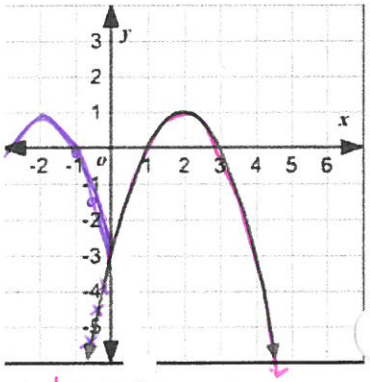


sketch |f(x)|



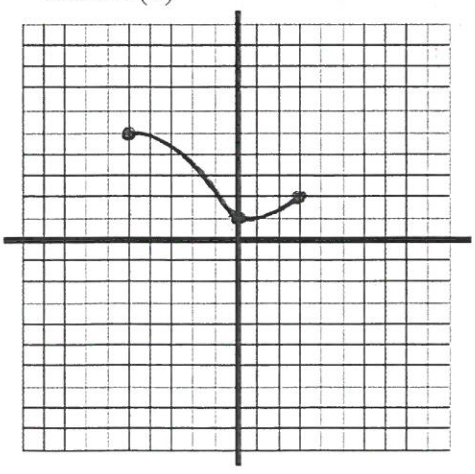
x's stay same
all y's become pos.

sketch f(|x|)

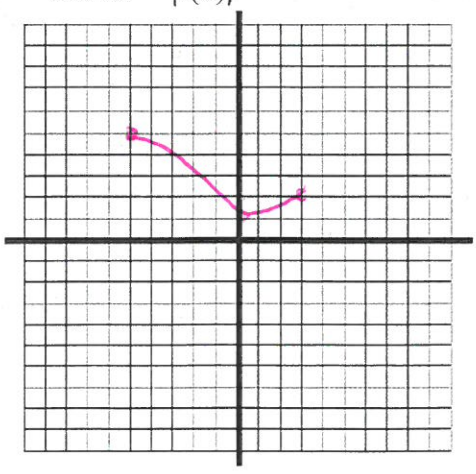


y's stay same
pos. x's stay same
neg. x's "act" like pos x's
i.e. x = -5 has same y value as x = 5

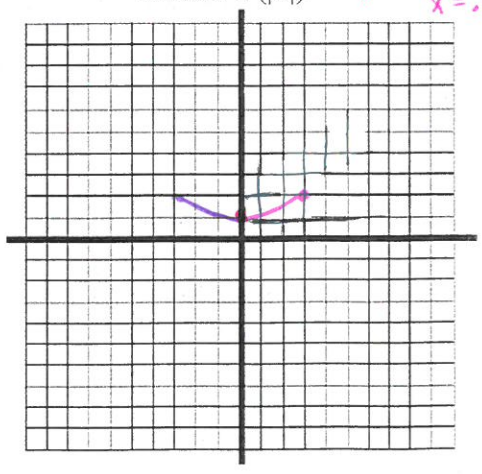
Given f(x)



sketch |f(x)|



sketch f(|x|)



@ x = -1 y needs to be same as for x = 1.
neg x's "act" like pos x's