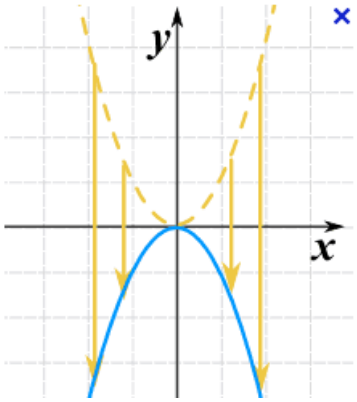
Reflections

Lesson 3



Reflection - a transformation where each point of the original graph has an image point resulting from a reflection in a line. (Called the line of reflection)

We will consider three basic lines of reflection for the function $y = f(x)$

1. To reflect $y = f(x)$ in the x-axis, all y-values change sign.

so,

$$-y = f(x)$$

$$y = -f(x)$$

(This as a reflection over x-axis)

Mapping: $(x, y) \rightarrow (x, -y)$

*Think - y=3 becomes y=-3 which means the x-axis is the line of symmetry.

On Calculator, if $y_1 = f(x)$, then $y_2 = -(y_1)$

2. To reflect $y = f(x)$ in the y-axis, all x-values change sign.
so, $y = f(x)$ transforms to $y = f(-x)$

(This as a reflection over y-axis)

Mapping: $(x, y) \rightarrow (-x, y)$

*Think - x = 2 becomes x = - 2 which means the y-axis is the line of symmetry.

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3. To reflect $y = f(x)$ in the line $y = x$, we use the inverse of $y = f(x)$

We exchange x & y so that $x = f(y)$

Mapping: $(x, y) \rightarrow (y, x)$

We will be studying this further in a couple of lessons.
Note: inverse notation is $y = f^{-1}(x)$ if the inverse is also a function.

Invariant points - these are points that do not change under transformation.

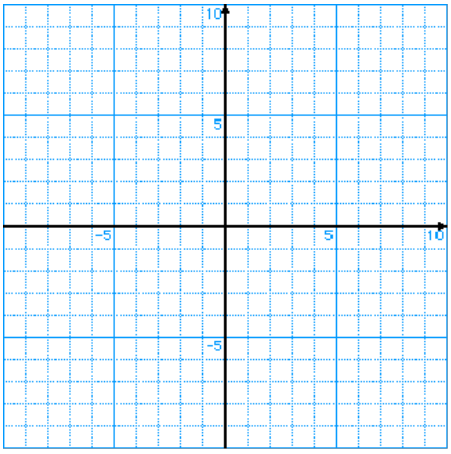
$(x, y) \rightarrow (x, y)$

Points on a line of reflection are invariant.

Example 1. Graph each of the following.

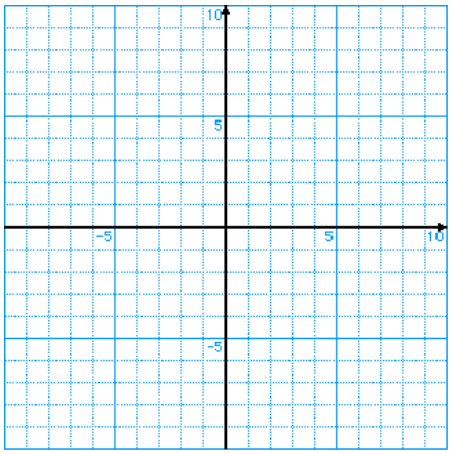
$y = x^2$

$y = (-x)^2$



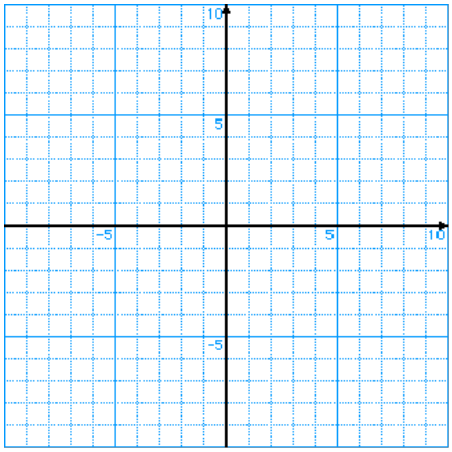
$y = x^3$

$y = (-x)^3$



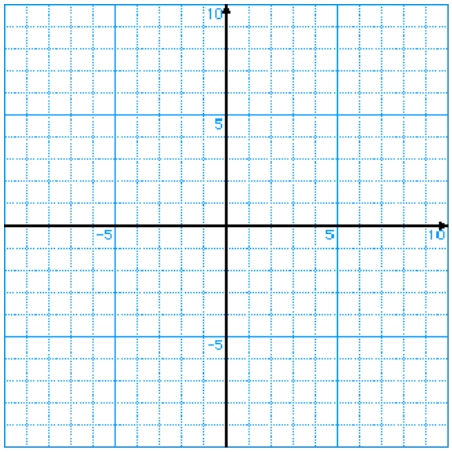
$y = \frac{1}{x}$

$y = \frac{1}{(-x)}$



$y = \sqrt{x}$

$y = \sqrt{(-x)}$



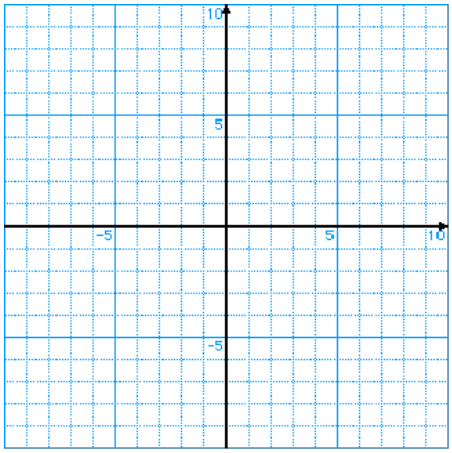
Describe how the graph of $y = f(-x)$ is related to the graph of $y = f(x)$

In the reflection of $y = f(x)$, to $y = f(-x)$, what are the invariant points?

Example 2. Graph each of the following.

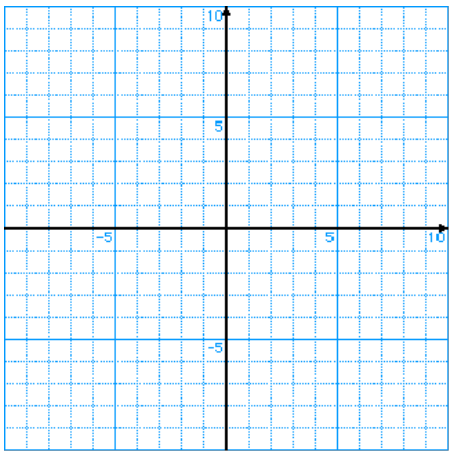
$y = x^2$

$y = -(x)^2$



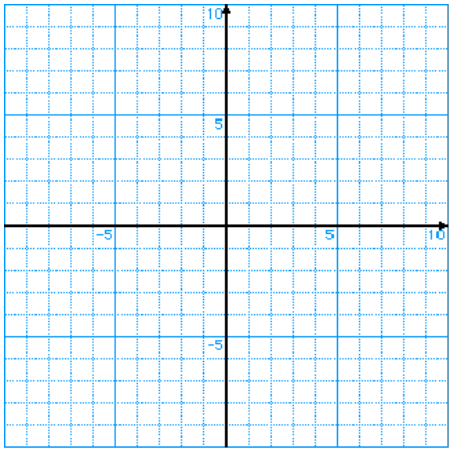
$y = x^3$

$y = -(x)^3$



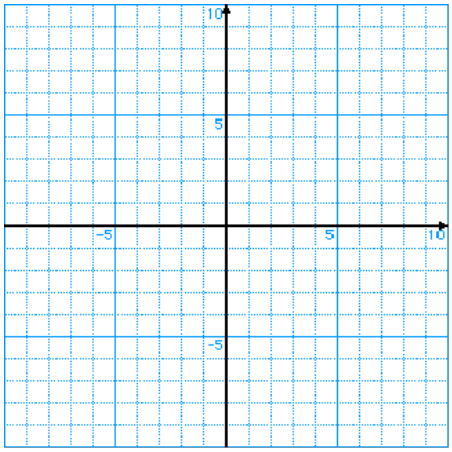
$y = \frac{1}{x}$

$y = -\frac{1}{(x)}$



$y = \sqrt{x}$

$y = -\sqrt{(x)}$



Describe how the graph of $y = -f(x)$ is related to the graph of $y = f(x)$

In the reflection of $y = f(x)$, to $y = -f(x)$, what are the invariant points?

Homework

1. Assignment Handout "Reflections"

2. Text Pages 28 - 31, Exercises # 1, 3, 4, 7bd, 14b, 15ab, 16, C1, C5.

Reflections Assignment 1.doc

Attachments

Translations Assignment 1.doc

Reflections Assignment 1.doc