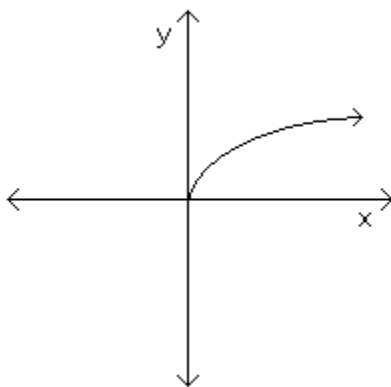


Other Functions and Reflections

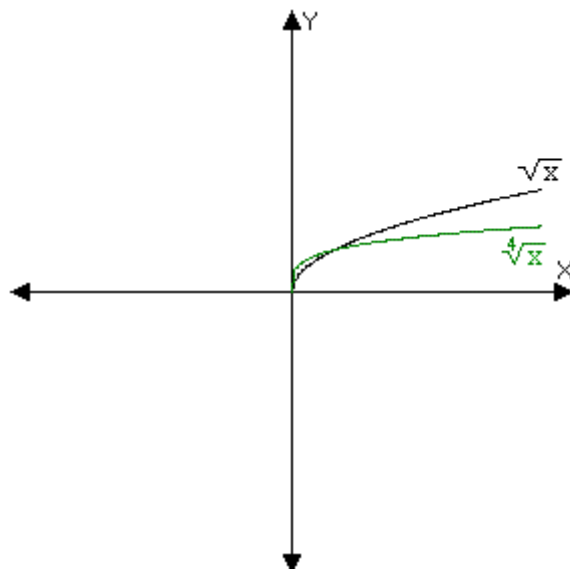
Root Functions:

We will briefly consider root functions. These are functions of the form $f(x) = \sqrt[n]{x}$. The domain, range, and graph of these functions will depend on the index of the radical.

When n is 2, the function will be a square root function. The domain of a square root function is limited to only numbers greater than or equal to zero because it is not possible to take the square root of a negative number. The graph of $f(x) = \sqrt{x}$ is shown below.

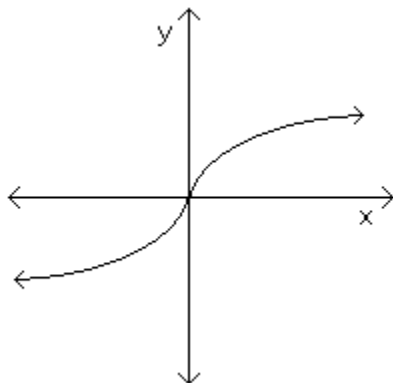


The graphs of other root functions with an even index will be similar to that of the square root function but only stretched flatter along the x-axis.

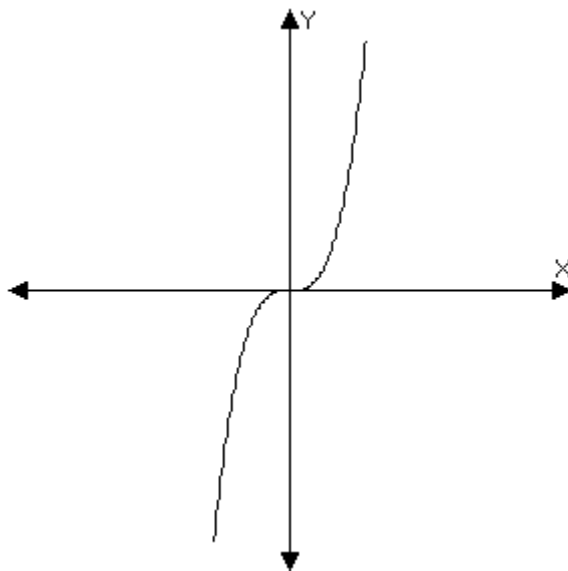


Root Functions (Continued):

When n is 3, the function will be a cube root function. The domain of a cube root function is not limited like the square root function and can be all real numbers. The graph of $f(x) = \sqrt[3]{x}$ is shown below.

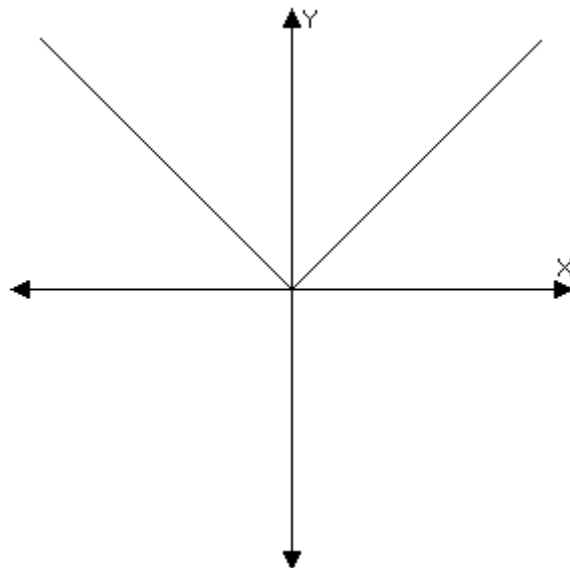
**Cubic Functions:**

A cubic function is a power function with a degree power of 3. The domain of a cubic function is all real numbers because the cubic function is a polynomial function, which are continuous curves. The graph of $f(x) = x^3$ is shown below.



Absolute Value Function:

An absolute value function is a function that has the shape of a V with its vertex at the origin. The domain of an absolute value function is all real numbers but its range is limited to only those numbers that are greater than or equal to. The graph of $f(x) = |x|$ is shown below.

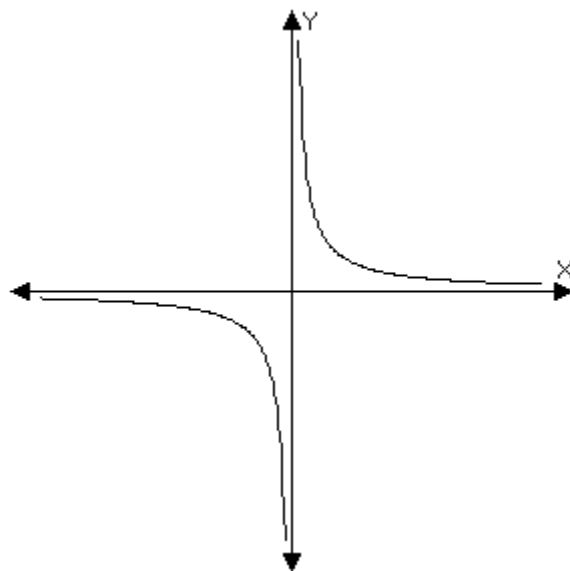
**Reciprocal Functions:**

Recall that $x^{-n} = \frac{1}{x^n}$.

Graphs of the functions of this form are called reciprocal functions. Since the variable x is in the denominator of a fraction the domain of the function will be restricted to where the denominator cannot be equal to zero. The graph of a reciprocal function will depend on the exponent n and what variable expression is in the denominator. For now we will only look at the situation of $1/x$.

Reciprocal Functions (Continued):

For the function $\frac{1}{x}$, the denominator cannot be zero. Also, since the numerator is a constant the function will never be equal to zero. It will, however, approach zero as x gets larger in both the negative and positive directions.



Reflections:

Functions can be reflected about the x -axis or y -axis by the multiplication of -1 . Where the multiplication occurs will determine which axis the graph is reflected about. Let's use the square root function as an example of reflection. If we multiply the radicand by -1 , we would have the function $\sqrt{-x}$.

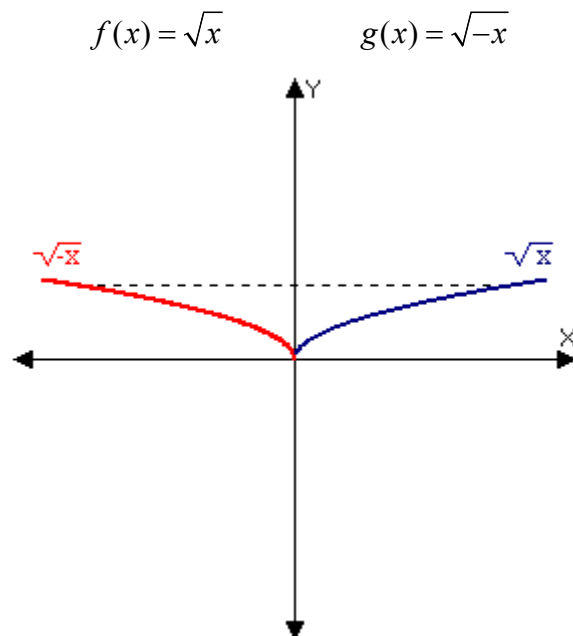
$$f(x) = \sqrt{x}$$

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

Since the -1 is being multiplied to x inside the radicand this would result in a reflection about the y -axis because the signs on the x -values will be change.

Reflections (Continued):

Reflection about the y-axis.



Now if the -1 is multiplied to the original function then we would end up with a reflection about the x-axis. Since the -1 is being multiplied to the original function the values that are being changed are the y values.

$$f(x) = \sqrt{x} \qquad g(x) = -\sqrt{x}$$

Reflection about the x-axis.

