

MATH 1010 ~ Intermediate Algebra Chapter 3: Linear Equations and Inequalities

Section 3.7: Graphs of Functions

**Objectives:**

- \* Sketch the graph of a function on a rectangular coordinate system.
- \* Identify the graphs of basic functions.
- \* Use the Vertical Line Test to determine if a graph is a function.
- \* Use the vertical and horizontal shifts and reflections to sketch the graphs of functions.

The image shows three separate coordinate systems on a grid. The first graph shows a square root function starting at the origin and curving upwards and to the right. The second graph shows an absolute value function forming a V-shape opening upwards with its vertex at the origin. The third graph shows a parabola opening upwards with its vertex at the origin.

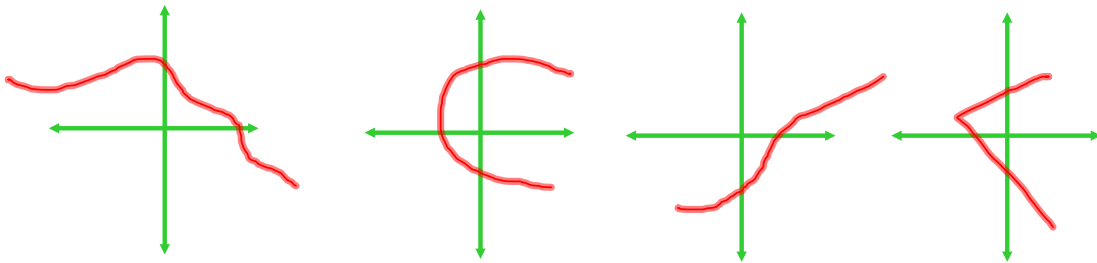
We have already seen graphs of several basic functions.

<p>Linear <math>y = x</math></p>	<p>Absolute value <math>y =  x </math></p>	<p>Parabola <math>y = x^2</math></p>
<p>Cubic <math>y = x^3</math></p>	<p>Square root <math>y = \sqrt{x}</math></p>	

The image displays five coordinate systems, each consisting of a horizontal x-axis and a vertical y-axis with arrows at their ends. The axes are drawn in green. The first row contains three graphs: Linear ( $y = x$ ), Absolute value ( $y = |x|$ ), and Parabola ( $y = x^2$ ). The second row contains two graphs: Cubic ( $y = x^3$ ) and Square root ( $y = \sqrt{x}$ ).

The Vertical line test states that a graph is a function if any vertical line only goes through at most one point on the graph.

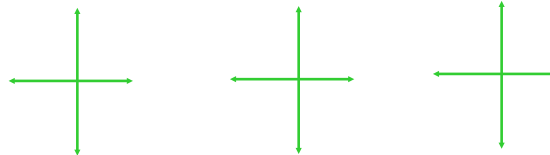
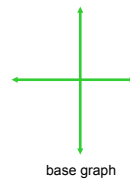
Examples: Function or not?



Transformations of Graphs

Vertical shifts:

Horizontal shifts:



Reflection across the x-axis:                      Reflection across the y-axis:

① EXAMPLE:

Sketch the graph. State the domain and range.

a)  $f(x) = x^2 - 3$

b)  $f(x) = (x - 4)^2$

c)  $f(x) = -\sqrt{x + 3}$

d)  $g(x) = -|x+2|-1$



e)  $h(x) = \begin{cases} 2-x^2 & \text{if } x \leq 1 \\ x-2 & \text{if } x > 1 \end{cases}$

