Page 26

Confirm that f and g are inverses by showing that f(g(x)) and g(f(x)) = x.

A. $f(x) = x^2 + 1$ and $g(x) = \sqrt{x-1}$

$f(g(x)) = (\sqrt{x-1})^2 + 1 = x - 1 + 1 = x$

$g(f(x)) = \sqrt{(x^2+1) - 1} = \sqrt{x^2} = x$

B) $f(x) = \frac{x+3}{4}$ $g(x) = 4x - 3$

$(f \circ g)(x) = f(g(x)) = \frac{(4x-3)+3}{4} = \frac{4x}{4} = x$

$(g \circ f)(x)$ $g(f(x)) = \cancel{4}\left(\frac{x+3}{\cancel{4}}\right) - 3 = x + 3 - 3 = x$

$-2(x-1) = -2x + 2$

32) $f(x) = \frac{x+3}{x-2}$ and $g(x) = \frac{2x+3}{x-1}$

$f(g(x)) = \frac{\left(\frac{2x+3}{x-1}\right) + 3\frac{(x-1)}{(x-1)}}{\left(\frac{2x+3}{x-1}\right) - 2\left(\frac{x-1}{x-1}\right)} = \frac{\frac{2x+3+3(x-1)}{(x-1)}}{\frac{2x+3-2(x-1)}{(x-1)}} = \frac{2x+3+3x-3}{2x+3-2x+2} = \frac{5x}{5} = x$

$\frac{\frac{1}{(x-1)}}{\frac{2}{(x-1)}}$

$\frac{1}{(x-1)} \div \frac{2}{(x-1)}$

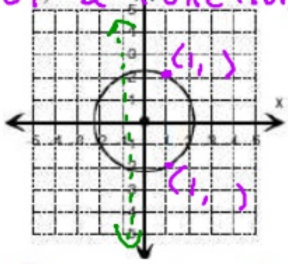
$\frac{1}{\cancel{(x-1)}} \cdot \frac{\cancel{(x-1)}}{2}$

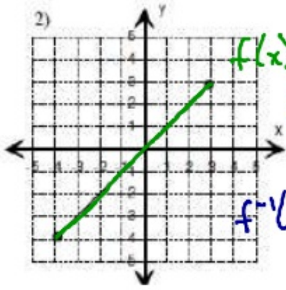
$g(f(x)) = \frac{2\left(\frac{x+3}{\cancel{x-2}}\right)\cancel{(x-2)} + 3(x-2)}{\left(\frac{x+3}{\cancel{x-2}}\right)\cancel{(x-2)} - 1(x-2)} = \frac{2(x+3)+3(x-2)}{x+3-(x-2)} = \frac{2x+6+3x-6}{x+3-x+2} = \frac{5x}{5} = x$

Horizontal Line Test

Is the relation a function? Does the relation have an inverse?
If the function has an inverse, sketch the graph of the inverse.

Not a function





$f(x) = x$

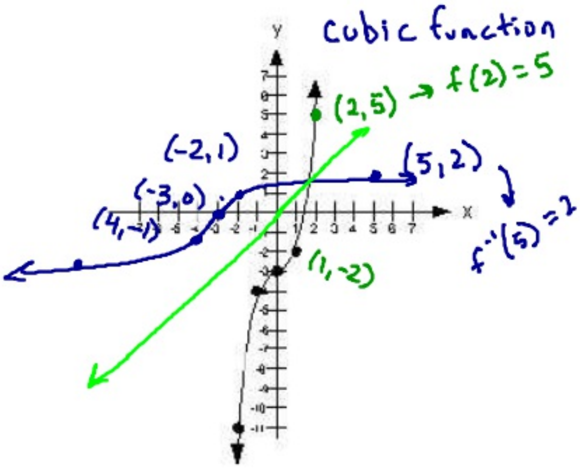
Function

$f^{-1}(x) = X$

Vertical Line Test →

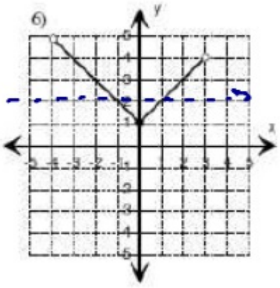
* For every input there is exactly 1 output

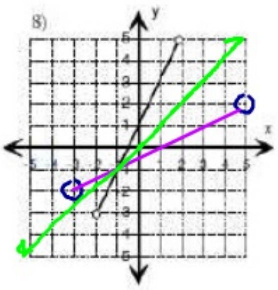
cubic function

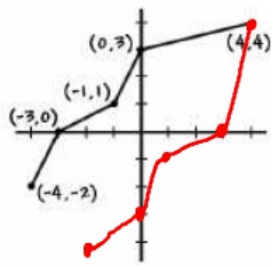


Function

No Inverse





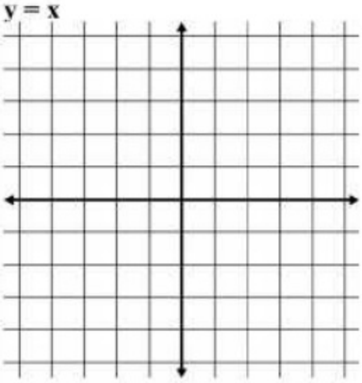


PRE-CALCULUS: by Finney, Demana, Watts and Kennedy
Chapter 1: Functions and Graphs 1.5: Library of Functions and Inverses

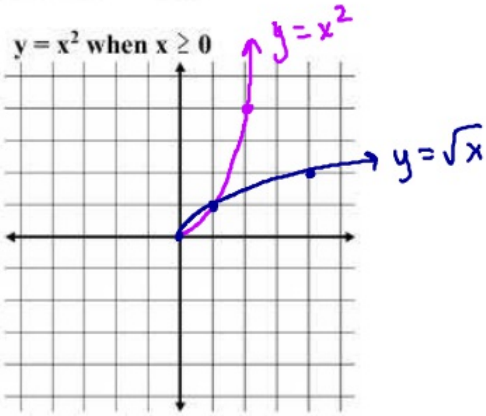
What you'll Learn About

Sketch a graph of the following functions and their inverses

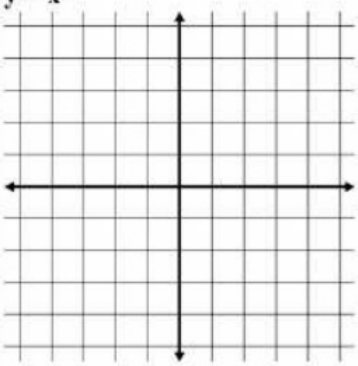
$y = x$



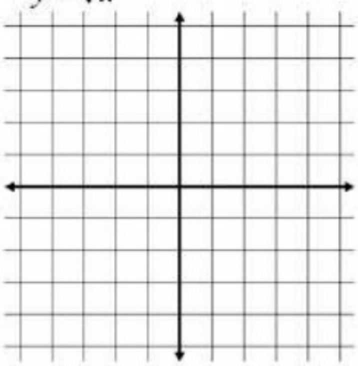
$y = x^2$ when $x \geq 0$



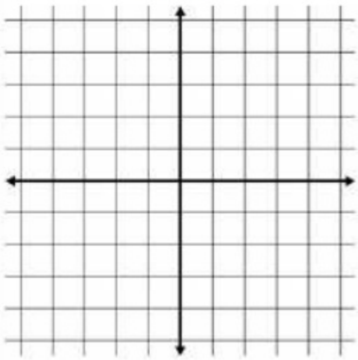
$y = x^3$



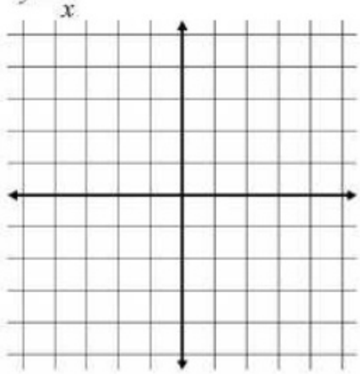
$y = \sqrt{x}$



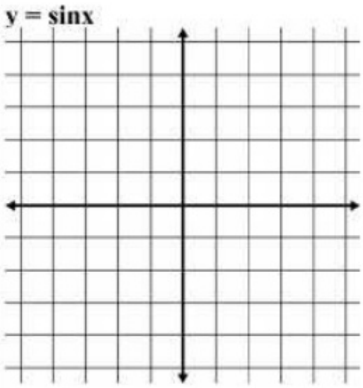
$y = |x|$ $x \geq 0$



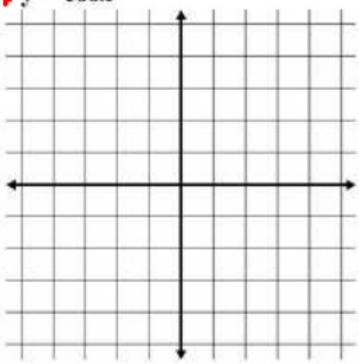
$y = \frac{1}{x}$



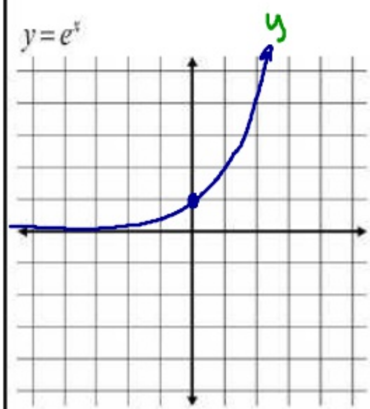
* $y = \sin x$



* $y = \cos x$



$y = e^x$



$y = \ln x$