

2.8 Inverse Functions

Name _____

Two functions $f(x)$ and $g(x)$ are **inverses** if $f(g(x)) = x$ and $g(f(x)) = x$ (for all x values in the domains of g and of f , respectively).

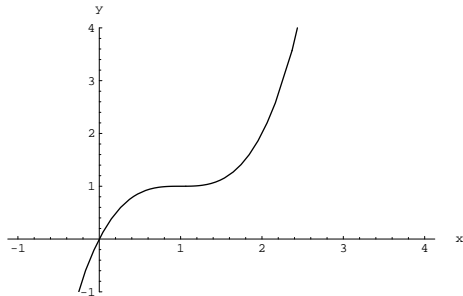
A function f has an inverse if and only if f is 1-1.

A function f is 1-1 if and only if the graph of f passes the horizontal line test.

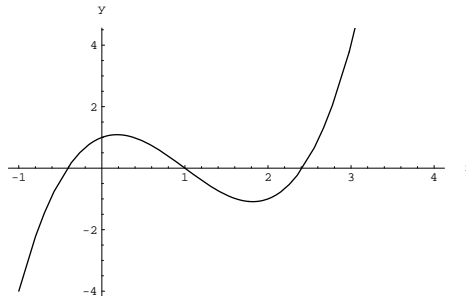
1. Determine whether the functions below are inverses.

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

2. Determine which of the following are graphs are 1-1 functions.



$$f(x) = (x-1)^3 + 1$$



$$f(x) = \frac{25}{14}\left(x + \frac{2}{5}\right)(x - 1)\left(x - \frac{7}{5}\right)$$

Once we determine that a function has an inverse we can find the inverse using a three step process.

Find the inverse of $f(x) = \sqrt[3]{x+2}$.

Step 1: $y = \sqrt[3]{x+2}$ •Write $y = f(x)$.

Step 2: $y^3 = (\sqrt[3]{x+2})^3$ •Solve for x .

$$y^3 = x + 2$$

$$y^3 - 2 = x$$

Step 3: $x^3 - 2 = f^{-1}(x)$ •Replace x for y and $f^{-1}(x)$ for x .

3. Determine if the function is 1-1 (Hint: start by graphing the function). If it is find the inverse ($f^{-1}(x)$).

a) $f(x) = 4x + 3$

b) $g(x) = (x + 1)^2$

c) $h(x) = (x + 1)^3$