Calculus Section 5.3 Inverse Functions  
-Verify that one function is the inverse function of another  
-Determine whether a function has an inverse

Homework: page 343 #’s 1, 5, 7, 35-41 odd (only part a), 47, 87, 89-92

**Definition of the Inverse of a Function**  
A function *g* is the **inverse function** of the function *f* if \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

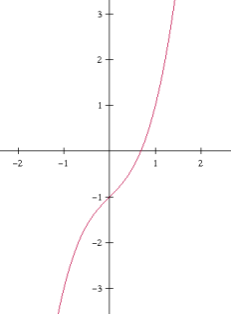
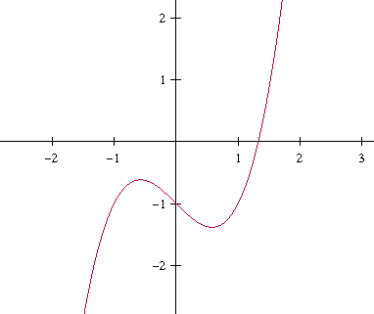
If *g* is the inverse of *f*, then *f* is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

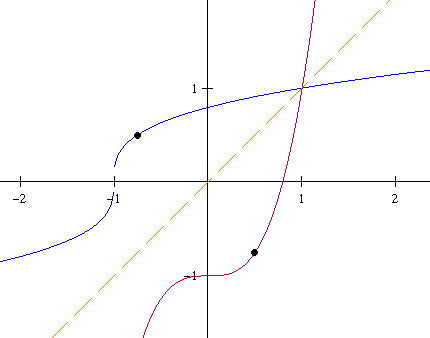
The function g is denoted by f-1(x).  
  
A function does not have to have an inverse function, but if it does, the inverse function is \_\_\_\_\_\_\_\_\_\_\_.

If a function has an inverse, then the inverse can be found by switching the x and y variables and solving for y.

**Example)**Find the inverse of f(x) = 2x3 – 1 and verify they are inverses using composition.

**Existence of an Inverse Function: The Horizontal Line Test**If any horizontal line crosses a function more than once, then the function fails the horizontal line test and does not have an inverse function.

x3 + x – 1 x3 – x – 1

**Properties on a Function and Its Inverse**1) If *f* is continuous on its domain, then f -1 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on its domain.  
2) If *f* is increasing on its domain, then f -1 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on its domain.  
3) If *f* is decreasing on its domain, then f -1 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on its domain.  
4) If *f* is differentiable on an interval containing c and,   
then f -1 is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at f(c).  
5) If *f* contains the point (a,b), then f -1 contains the point \_\_\_\_\_\_\_\_\_\_.  
6) The graphs of *f* and f-1 are reflections over the line \_\_\_\_\_\_\_\_\_\_\_.