

Calculus AB

5-3

Inverse Functions

Inverse of a function

Blue Collar Definition - Two functions are inverses if

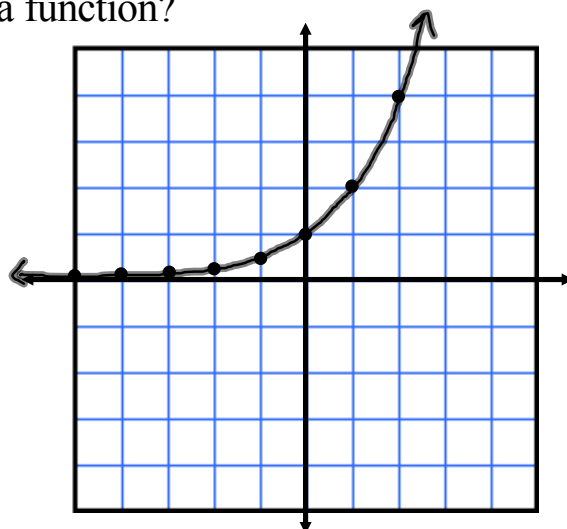
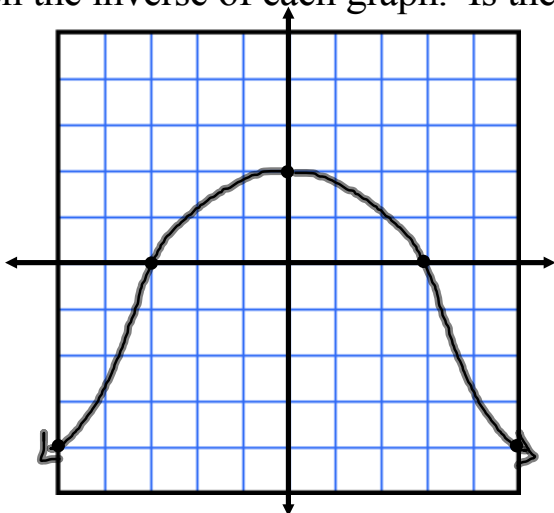
Graphical Definition - Two functions are inverses if

Mathematician's Definition - Two functions $f(x)$ and $g(x)$ are inverses iff

Show that f and g are inverse functions. (pg 349)

$$2) f(x) = 3 - 4x ; g(x) = \frac{3 - x}{4}$$

Sketch the inverse of each graph. Is the inverse a function?



Definitions

1) function -

2) one-to-one function -

3) monotonic function -

Use a graphing utility to graph the function. Determine whether it is one-to-one on its entire domain.

$$20) f(x) = 5x\sqrt{x-1}$$

Find the inverse function of f .

$$32) f(x) = 3\sqrt[5]{2x-1}$$

Use the derivative to determine whether the function is strictly monotonic on its entire domain and therefore has an inverse function.

$$44) f(x) = (x+a)^3 + b$$

Derivatives of Inverses

Given $f(x)$ and its inverse $f^{-1}(x)$, $f'(c) = \frac{1}{(f^{-1})'(c)}$

Translate the above definition into words:

Let f be a function that is differentiable on an interval I .
If f has an inverse function g , then g is differentiable at any x
for which $f'(g(x)) \neq 0$ and

Find $(f^{-1})'(a)$ for the function f and the real number a .

$$72) f(x) = 5 - 2x^3 ; a = 7$$

Assignment:

Pg. 349

1 - 45 odd,

71 - 93 odd.