5.3 Inverse Functions

check to see if $f(g(x)) = g(f(x))$

Ex1 $f(x) = 2x^3 - 1$ $g(x) = \sqrt[3]{\frac{x+1}{2}}$

$f(g(x)) =$

$2\left(\sqrt[3]{\frac{x+1}{2}}\right)^3 - 1$

$2\left(\frac{x+1}{2}\right) - 1$

$x + 1 - 1$

x

$g(f(x)) =$

$\sqrt[3]{\frac{2x^3 - 1 + 1}{2}}$

$\sqrt[3]{\frac{2x^3}{2}}$

$\sqrt[3]{x^3}$

x

f & g are inverses

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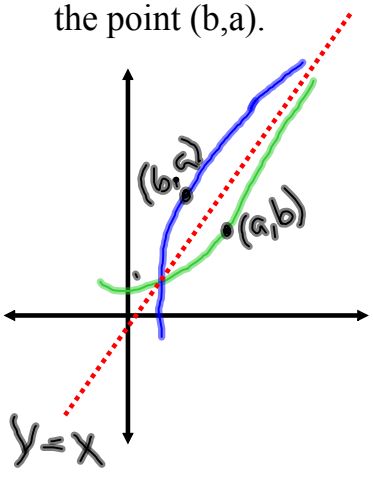
Reflective Property of Inverse Functions

The graph of f contains the point (a,b) if and only if the graph of f^{-1} contains the point (b,a).



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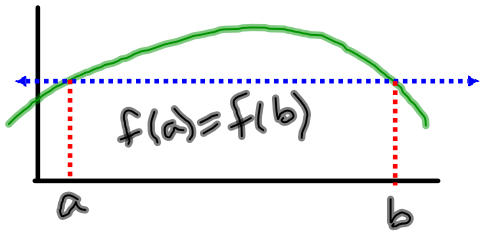
Existence of an Inverse Function

Not every function has an inverse, it has to pass the horizontal line test



No Inverse

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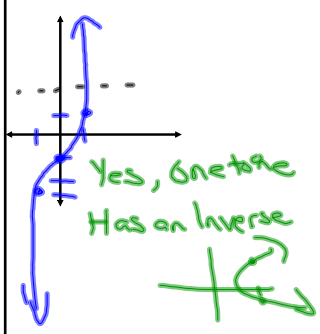
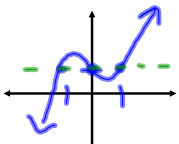
Ex 2 Which has an inverse?

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



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



$f(-1)=f(0)=f(1)=1$
Not-one to one
NO, Inverse

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Ex3 Finding an Inverse

$f(x) = \sqrt{2x-3}$ solve for y.

$y = \sqrt{2x-3}$

$y^2 = \sqrt{2x-3}^2$

$x^2 = \sqrt{2y-3}$

$x^2 = 2y - 3$

$f^{-1}(x) = \frac{x^2+3}{2}$

$f(f^{-1}(x)) = x$ if it is a true inverse.

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Pg 347

1-7 odd

9-12

23-33 odd

Mar 9-10:22 AM

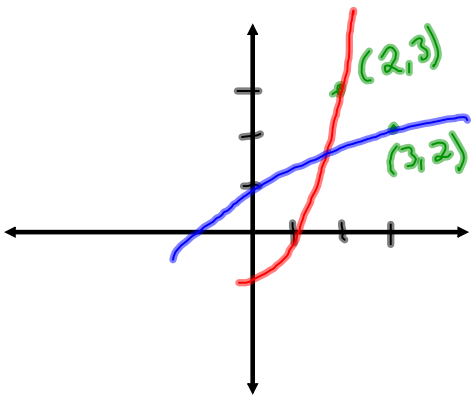
Ex 4 Evaluating the Derivative

$f(x) = \frac{1}{4}x^3 + x - 1$

a) $f^{-1}(3) =$

b) $(f^{-1})'(x)$ when $x = 3$

$(f^{-1})'(3) =$



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☆ Graphs of inverse functions have reciprocal slopes

Let $f(x) = x^2$ let $f^{-1}(x) = \sqrt{x}$ show that the slopes of the graphs of f and f^{-1} are reciprocals at each point.

Ex 5 (2,4) and (4,2)

Ex 6 (3,9) and (9,3)

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Hwk 347

1-7, all

9-12, 23-33, all

71, 72, 83

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