

Friday December 16, 2011
HW #29

Q: How do we find the inverse of a given function?

HW #21-#34 due 1/17/2012 at 11:45 pm
Final Exam 1/17/2012
Please Return textbook on 1/17/2012
Tutoring Wed/Fri 3-4:30pm Room 319B.

Do Now

- Determine if f and g are functions
- Is there ANY relationship between f and g

$f = \{(-3, 9), (-2, 4), (-1, 1), (0, 0), (1, 1), (2, 4), (3, 9)\}$
 $g = \{(1, -3), (4, -2), (9, -1), (16, 0), (25, 1), (36, 2), (49, 3)\}$

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- $f(x)$ is function
 g is not function
- They are the inverse of each other

ex) $(-3, 9) \xrightarrow{\text{inverse}} (9, -3)$

What is the inverse of a function?

- Switch the x, y
- x becomes y and y becomes x

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I - Inverse of a function (f^{-1})

1) functions - there are 2 types of functions

- one-to-one functions - x, y ARE unique
ex) $(1, 4), (2, 3), (6, 5)$
 $f^{-1} \rightarrow (4, 1), (3, 2), (5, 6)$
- many-to-one functions - y value is not unique
ex) $(4, 1), (3, 2), (5, 1)$
 $f^{-1} (1, 4), (2, 3), (1, 5)$

2) The inverse of one-to-one function is a one-to-one function. The inverse of many-to-one function is not a function.

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3) if $g(x) = \frac{1}{2}x + 1$ find $g^{-1}(x)$

$y = \frac{1}{2}x + 1$
 $x = 2(y - 1)$
 $x = 2y - 2$
 $x + 2 = 2y$
 $\frac{x + 2}{2} = y$

check: $g(g^{-1}(x)) = \frac{1}{2}(\frac{x+2}{2}) + 1 = \frac{x+2}{4} + 1 = \frac{x+2+4}{4} = \frac{x+6}{4}$
 $g^{-1}(g(x)) = \frac{x+2}{2} = \frac{2(\frac{1}{2}x + 1) + 2}{2} = \frac{x + 2 + 2}{2} = \frac{x+4}{2}$

Are inverse functions commutative? $g(g^{-1}(x)) \neq g^{-1}(g(x))$

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II - Inverses of Absolute value functions

1) function $y = |x|$ what is the inverse?

$x = |y|$

Graphs of $y = |x|$ and $x = |y|$ are shown. The graph of $x = |y|$ is not a function as it fails the vertical line test.

x	y
2	-2
1	-1
0	0
1	1
2	2

Not a function

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