Algebra 2

Lesson 6-7

Inverse Relations and Functions

Goal: to find inverse relations or functions

What is wrong with the following headline? What should it be?

Mayor's Salary Restored

At last night's council meeting, the town approved a 20% increase in the mayor's salary. This follows last year's 20% decrease. The mayor's

In the news story, they were trying to say that a 20% increase will "undo" a 20% decrease (which it does not). When you are looking for inverse functions, you are looking for what will "undo" the function.

If a relation pairs elements *a* of the domain with elements *b* of the range, the inverse pairs *b* with *a*.

(a, b) the inverse is (b, a)

If both are functions, then they are inverse functions.

Name the inverse:

x	-2	-1	0	1
y	2	0	3	0

Yes

x	2	0	3	0
y	-2	-1	0	1

No

Are they inverse functions?

No

To find the inverse of a function, you switch the domain and range. In an equation, this means that you switch x and y. You then solve for the new y. This will be the inverse of the original equation.

Find the inverse:

$y = 2x + 8$

$x = 2y + 8$

$x - 8 = 2y$

$y^{-1} = \frac{x-8}{2} = y^{-1} = \frac{1}{2}x - 4$ (y-inverse)

$y = 5x^2 + 2$

$x = 5y^2 + 2$

$x - 2 = 5y^2$

$\frac{x-2}{5} = y^2$

$y^{-1} = \pm\sqrt{\frac{x-2}{5}}$

$g(x) = -\frac{2}{3}x + 7$

$y = -\frac{2}{3}x + 7$

$x = -\frac{2}{3}y + 7$

$-7 \quad -7$

$-\frac{3}{2}(x-7) = -\frac{3}{2}\left(-\frac{2}{3}y\right)$

$-\frac{3}{2}x + \frac{21}{2} = y^{-1}$

a) domain of g? $\mathbb{R}$

b). g^{-1}?

c). domain of inverse? $\mathbb{R}$

d). is inverse a function? Yes

What is the formula for finding the area of a circle? Find its inverse. What is the radius of a circle with area $30ft^2$?

$A = \pi r^2$

$\sqrt{\frac{A}{\pi}} = \sqrt{\frac{\pi r^2}{\pi}}$ (note: no ± because it represents Area)

$A^{-1} = \sqrt{\frac{A}{\pi}}$

$\sqrt{\frac{30}{\pi}} = \sqrt{\frac{\pi r^2}{\pi}}$ $r = 3.1$ ft

If $(f^{-1} \circ f)(x) = x$ and $(f \circ f^{-1})(x) = x$, then the functions are one-to-one.

$f^{-1}(f(x)) = x \quad f(f^{-1}(x)) = x$

Let $g(x) = \frac{4}{x+2}$

Find:

$y = \frac{4}{x+2}$

$(y+2)x = \frac{4}{y+2}(y+2)$

$(y+2)x = 4$

a) $g^{-1} = \frac{4}{x} - 2$

$yx + 2x = 4$

$yx = 4 - 2x$

$y = \frac{4}{x} - 2$

or

$\frac{(y+2)x}{x} = \frac{4}{x}$

$y + 2 - 2 = \frac{4}{x} - 2$

$y^{-1} = \frac{4}{x} - 2$

b) $(g \circ g^{-1})(0)$

c) $(g^{-1} \circ g)(0) = 2$

$g(g(0)) = \frac{4}{0+2} - 2 = 0$

Hwk: pg 410-411

#10-24 evens,

54 - 62 (4th)