Name: KEY

Topic: 7.4 Inverse Functions

Summary:

An inverse relation maps the output values back to their original input values.

Original Relation

x	-2	-1	0	1	2
y	4	2	0	-2	-4

Inverse Relation

x	4	2	0	-2	-4
y	-2	-1	0	1	2

* x + y Values Switch (trade places)

To find the inverse of a relation that is given by an equation in x and y, switch the roles of x and y and solve for y (if possible).

f(x) is used for the original function
$f^{-1}(x)$ is used for the inverse function

Example:

$y = -3x + 6$ The original Equation

$x = -3y + 6$ Switch x and y, and solve for y

$-6 \quad -6$ Subtract 6

$\frac{x - 6 = -3y}{-3}$ Divide by -3

$y = -\frac{1}{3}x + 2$ Simplify and write in slope-intercept form

7.4 Notes

Now we are going to verify that two functions are inverses.

$f(x) = -3x + 6$ $\qquad$ $f^{-1}(x) = -\frac{1}{3}x + 2$

Step 1: Rewrite the function except replace the x with parenthesis leaving space to write an expression inside.

$f(x) = -3(\quad\quad) + 6$

Step 2: Fill in the parenthesis with the inverse function.

$f(x) = -3\left(-\frac{1}{3}x + 2\right) + 6$

Step 3: Simplify

$f(x) = x - 6 + 6$ (Distribute the -3 to all parts inside the parenthesis)

$f(x) = x$ (Combine like terms)

Step 4: Check to make sure you got "x". If you do, repeat the process by taking the inverse and replacing that x with the original function.

Step 5: Rewrite the inverse function except replace the x with parenthesis leaving space to write an expression inside.

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

Step 6: Fill in the parenthesis with the function.

$f^{-1}(x) = -\frac{1}{3}(-3x + 6) + 2$

Step 7: Simplify

$f^{-1}(x) = x - 2 + 2$ (Distribute the $--\frac{1}{3}$ to all parts inside the parenthesis)

$f(x) = x$ (Combine like terms)

If you ended both sections with an "x" then they are inverses!