*re-write f(x) as y
- switch x and y
- solve for y
* re-write as $f^{-1}(x)$ if necessary

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Mr. Schlansky Algebra II

Finding the Inverse of a Function Algebraically

1. What is the inverse of the function $y = 2x - 3$?

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

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

2. Find the inverse of y = 3x + 2.

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

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

3. If $f(x) = 5x - 7$, find $f^{-1}(x)$

$y = 5x - 7$
$x = 5y - 7$
$+7 \quad +7$
$\frac{x+7}{5} = \frac{5y}{5}$
$\frac{1}{5}x + \frac{7}{5} = y$

$f^{-1}(x) = \frac{1}{5}x + \frac{7}{5}$

4. What is $g^{-1}(x)$ if $g(x) = 3x + 6$

$y = 3x + 6$
$x = 3y + 6$
$-6 \quad -6$
$\frac{x-6}{3} = \frac{3y}{3}$
$\frac{1}{3}x - 2 = y$

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

5. What is the inverse of $y = \frac{1}{2}x + 2$?

$2(x = \frac{1}{2}y + 2)2$
$2x = y + 4$
$-4 \quad -4$
$2x - 4 = y$

6. If $f(x) = x^2$, find $f^{-1}(x)$

$y = x^2$

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

$y = \sqrt{x}$

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

7. What is $h^{-1}(x)$ if $h(x) = x^2 + 2$

$y = x^2 + 2$

$x = y^2 + 2$

$-2 \quad -2$

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

$\sqrt{x-2} = y$

$h^{-1}(x) = \sqrt{x-2}$

8. Given $f(x) = \frac{2}{3}x + 6$, write the equation of $f^{-1}(x)$.

$y = \frac{2}{3}x + 6$

$3(x) = 3\left(\frac{2}{3}y\right) + 3(6)$

$3x = 2y + 18$

$-18 \quad -18$

$\frac{3x - 18}{3} = \frac{2y}{3}$

$\frac{3}{2}x - 9 = y$

$f^{-1}(x) = \frac{3}{2}x - 9$

9. What is the inverse of the function $y = 4x + 5$?

$x = 4y + 5$

$-5 \quad -5$

$\frac{x-5}{4} = \frac{4y}{4}$

$\frac{1}{4}x - \frac{5}{4} = y$

10. What is the inverse of $f(x) = -6(x - 2)$?

$y = -6(x-2)$

$x = -6(y-2)$

$x = -6y + 12$

$-12 \quad -12$

$\frac{x-12}{-6} = \frac{-6y}{-6}$

$-\frac{1}{6}x + 2 = y$

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