

Finding Inverse Functions

How to find the inverse of a one-to-one function $f(x)$:

You are given $f(x) = \text{blah, blah, blah}$

1. Write $y = f(x)$
2. Solve the equation for x in terms of y (this is not always possible).
3. Switch the x and y .
4. The result is $y = f^{-1}(x)$

IMPORTANT: Notice that $f(x) = x^2$ is NOT a one-to-one function $\rightarrow f(2) = f(-2) = 4$. However if you restrict its domain to say $x \geq 0$ then you can 'pretend' it is.

Example:

Given $f(x) = x^5 - 3$ find $f^{-1}(x)$

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|--------------------------------|---|
| 1. Write $y = f(x)$: | $y = x^5 - 3$ |
| 2. Solve for x : | $y + 3 = x^5$
$x^5 = y + 3$
$x = \sqrt[5]{y + 3}$ |
| 3. Switch x and y : | $y = \sqrt[5]{x + 3}$ |
| 4. Result is $y = f^{-1}(x)$: | $f^{-1}(x) = \sqrt[5]{x + 3}$ |

So the inverse of $x^5 - 3$ is $\sqrt[5]{x + 3}$