Inverse of function

* The inverse of $f(x)$ is written $f^{-1}(x)$
* The inverse of a function is where all x & y coordinates switch. $(x, y) \rightarrow (y, x)$

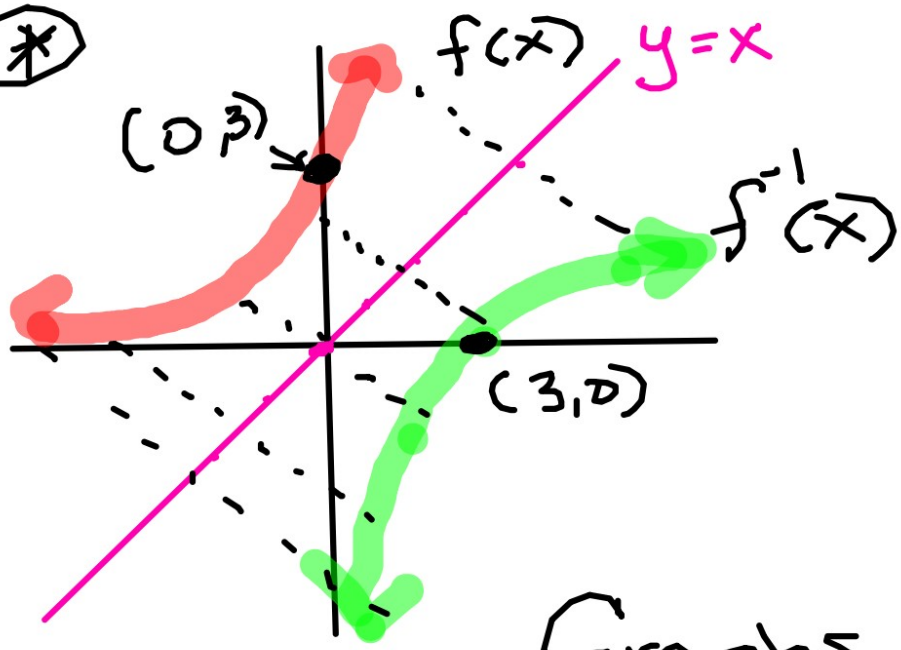
  $(5, -2) \rightarrow (-2, 5)$

Ex: $f(x) = \{(1,3)(4,5)(8,-10)\}$

$f^{-1}(x) = \{(3,1)(5,4)(-10,8)\}$

* The inverse of a function is the reflection over the line $y = x$.

(*)



sketch $f^{-1}(x)$

sketch $y=x$

$f^{-1}(x)$

Graphs

Steps to find the inverse of function

1. Change f(x) to "y" (y=)
2. Switch x & y
3. Solve for y

$$f(x) = 2x + 4$$
$$y = 2x + 4$$
$$x = 2y + 4$$

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

$f(x) = 5x - 3$

Find $\underline{f^{-1}(x)}$

$y = 5x - 3$

$x = 5y - \cancel{3}$

$+3 \qquad +\cancel{3}$

$\frac{x+3}{5} = \frac{\cancel{5}y}{\cancel{5}}$

$\frac{x+3}{5} = y$

$f^{-1}(x) = \frac{1x+3}{5}$

<u>or</u>

$f^{-1}(x) = \frac{1}{5}x + \frac{3}{5}$

$$\boxed{f(x) = x^2 + 3}$$

Find $f^{-1}(x)$

Example

$$\boxed{f^{-1}(x) = \sqrt{x-3}}$$

① $y = x^2 + 3$

② $x = y^2 + \cancel{3}$

$-3 \qquad -3$

$\sqrt{x-3} = \sqrt{y^2}$

③ $\sqrt{x-3} = y$