

Inverse Functions

an inverse function interchanges the domain and range

the graphs are also a reflection in the line $y = x$

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the composition $f(g(x)) = g(f(x)) = x$

Example: $y = x + 1 \quad \rightarrow \quad x = y + 1$

Example: $y = 2x + 3 \quad \rightarrow \quad x = 2y + 3$

Example: $y = x^2 \quad \rightarrow \quad x = y^2$

Example: $y = \frac{1}{2}x + 5 \quad \rightarrow \quad x = \frac{1}{2}y + 5$

NOTATION - solving the Inverse for y and calling it y' , then $f^{-1}(x)$

Example: $x = y + 1 \quad \rightarrow \quad \begin{aligned} x &= y' + 1 \\ x - 1 &= y' \end{aligned}$

Example: $x = 2y + 3 \quad \rightarrow \quad \begin{aligned} x &= 2y' + 3 \\ x - 3 &= 2y' \\ \frac{x - 3}{2} &= y' \end{aligned}$

Example: $x = y^2 \quad \rightarrow \quad \begin{aligned} x &= (y')^2 \\ \sqrt[2]{x} &= y' \end{aligned}$

Example: $x = \frac{1}{2}y + 5 \quad \rightarrow \quad \begin{aligned} x &= \frac{1}{2}y' + 5 \\ x - 5 &= \frac{1}{2}y' \\ 2(x - 5) &= y' \end{aligned}$