Inverse Functions

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Ex1   Let $f(x) = 2x + 3$

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

$$x \longleftarrow \boxed{\div 2} \longrightarrow \boxed{-3} \longleftarrow f(x)$$

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

$$f(4) = 2(4) + 3 = 11$$

$$f^{-1}(11) = \frac{11 - 3}{2} = \frac{8}{2} = 4$$

Ex2 $g(x) = x^2 - 4$

$$x \longrightarrow \boxed{\uparrow^2} \longrightarrow \boxed{-4} , \quad g(x)$$

$$x \longleftarrow \boxed{\sqrt{}} \longrightarrow \boxed{+4} \longleftarrow g(x)$$

$$g^{-1}(x) = \sqrt{x + 4}$$

$$g(5) = 5^2 - 4 = 25 - 4 = 21$$

$$g^{-1}(21) = \sqrt{21 + 4} = \sqrt{25} = 5$$

Ex 3

$$f(x) = \frac{1}{x} - 1$$

x → [↕] — [−1] → f(x)

x — [↕] — [+1] — f(x)

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

$$f(2) = \frac{1}{2} - 1 = -\frac{1}{2}$$

$$f^{-1}\left(-\frac{1}{2}\right) = \frac{1}{-\frac{1}{2}+1} = \frac{1}{\frac{1}{2}} = \frac{2}{1} = 2$$