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Math Worksheet: Inverse Functions (1)

1. Find the inverse of each function and check your answer.

A. $f = \{(2, 3), (5, 6), (-2, 0)\}$ $f^{-1} = \{(3, 2), (6, 5), (0, -2)\}$

Check: $f(f^{-1}(3)) = 3$, $f(f^{-1}(6)) = 6$, $f(f^{-1}(0)) = 0$

$f^{-1}(f(2)) = 2$, $f^{-1}(f(5)) = 5$, $f^{-1}(f(-2)) = -2$

B. $g(x) = \frac{x}{x-1}$

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

interchange x and y : $x = \frac{y}{y-1} \Rightarrow y = xy - x$

Solve for $y = g^{-1}(x) = \frac{x}{x-1}$

check: $g(g^{-1}(x)) = \frac{\frac{x}{x-1}}{\frac{x}{x-1} - 1} = \frac{\frac{x}{x-1}}{\frac{x - (x-1)}{x-1}} = \frac{x}{1} = x$

$g^{-1}(g(x)) = x$ since $g(x) = g^{-1}(x)$

C. $h(x) = \sqrt[3]{2x+1}$

$y = \sqrt[3]{2x+1}$

interchange x and y : $x = \sqrt[3]{2y+1}$

Cube both sides and solve for y .

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

check: $h(h^{-1}(x)) = \sqrt[3]{2\left(\frac{x^3-1}{2}\right)+1} = x$

$h^{-1}(h(x)) = \frac{(\sqrt[3]{2x+1})^3 - 1}{2} = \frac{2x+1-1}{2} = x$

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