$f^{-1}(x)$

Inverse of "f"

Switch x + y

solve for y

function

D – x-values

R – y-values

Inverse

D → Range of original

R → Domain of original

Find a formula for $f^{-1}(x)$. Give the domain of $f^{-1}(x)$, including any restrictions "inherited" from f.

A. $\underline{f(x) = 5x + 2}$

$f(x)$

D: $(-\infty,\infty)$

R: $(-\infty,\infty)$

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

D: $(-\infty,\infty)$

$y = 5x+2$

$x = 5y + 2$

$\quad -2 \qquad -2$

$x - 2 = 5y$

$y = \frac{x-2}{5} = \frac{1}{5}x - \frac{2}{5}$

$f^{-1}(x) = \frac{1}{5}x - \frac{2}{5}$

B. $f(x) = \frac{3x+2}{x-1}$

C. $f(x) = \sqrt{x+5}$

$f(x)$

D: $[-5,\infty)$

R: $[0,\infty)$

Inverse

D: $[0,\infty)$

$y = \sqrt{x+5}$

$(x)^2 = (\sqrt{y+5})^2$

$x^2 = y+5$

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

D. $f(x) = \sqrt{x^3 - 2}$

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

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

$x^2 = y^3 - 2$

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

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

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

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

$x^3 = 2y+1$

$x^3 - 1 = 2y$

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

	Confirm that f and g are inverses by showing that f(g(x)) and g(f(x)) = x. A. $f(x) = x^3 + 1$ and $g(x) = \sqrt[3]{x-1}$ Find $f(g(x))$ $f(g(x)) = \left(\sqrt[3]{x-1}\right)^3 + 1$ $= x - 1 + 1$ $= x$ $g(f(x)) = \sqrt[3]{x^3+1-1}$ $= \sqrt[3]{x^3}$ $= x$ 32) $f(x) = \dfrac{x+3}{x-2}$ and $g(x) = \dfrac{2x+3}{x-1}$ $f(g(x)) = \dfrac{\dfrac{2x+3}{x-1} + \dfrac{3}{1}\dfrac{(x-1)}{(x-1)}}{\dfrac{2x+3}{x-1} - \dfrac{2}{1}\dfrac{(x-1)}{(x-1)}}$ $\dfrac{\dfrac{2x\cancel{+3}+3x\cancel{-3}}{x-1}}{\dfrac{\cancel{2x}+3-\cancel{2x}+2}{x-1}}$ $\dfrac{\dfrac{5x}{\cancel{x-1}}}{\dfrac{5}{x-1}} \cdot \dfrac{\cancel{x-1}}{5}$ $\dfrac{5x}{5} = x$