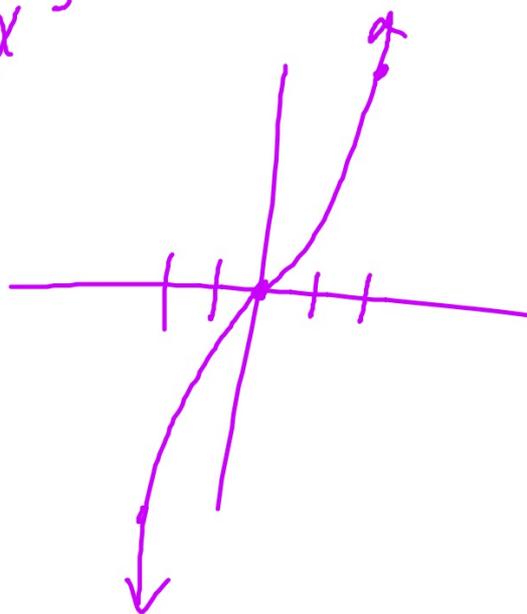


12.) $f(x) = x^3$

x	y
-2	-8
0	0
2	8



$$16) f(x) = \frac{-2}{x+1} \quad g(x) = \frac{-2}{x} - 1$$

$$f(g(x)) = \frac{-2}{\frac{-2}{x} - 1 + 1} = \frac{-2}{\frac{-2}{x}} = \cancel{2} \cdot \frac{x}{\cancel{-2}} = x$$

$$g(f(x)) = \frac{-2}{\frac{-2}{x+1}} - 1 = \cancel{-2} \cdot \frac{x+1}{\cancel{-2}} - 1$$
$$x+1-1 = x$$

$$\textcircled{4} \quad f(x) = -\frac{7}{2}x - 3 \quad g(x) = -\frac{2x+6}{7}$$

$$g(x) = \left(-\frac{2}{7}x - \frac{6}{7}\right)$$

$$f(g(x)) = \frac{-7}{2} \left(-\frac{2}{7}x - \frac{6}{7}\right) - 3$$

$$= x + 3 - 3 = x$$

$$\begin{aligned}g(f(x)) &= \frac{-2}{\frac{-2}{x+1}} - 1 \\&= \cancel{-2} \cdot \frac{(x+1)}{\cancel{-2}} - 1 \\&= x\end{aligned}$$

$$\begin{aligned}16.) \quad f(x) &= \frac{-2}{x+1} \\g(x) &= \frac{-2}{x} - 1 \\f(g(x)) &= \frac{-2}{\left(\frac{-2}{x} - 1\right) + 1} \\&= \frac{-2}{\frac{-2}{x}} = x\end{aligned}$$

$$17.) f(x) = \frac{x^4 - 1}{5} \quad g(x) = \sqrt[4]{5x+1}$$

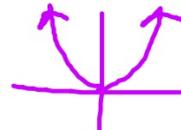
$$f(g(x)) = \frac{(\sqrt[4]{5x+1})^4 - 1}{5} = \frac{5x+1-1}{5} = x$$

$$g(f(x)) = \sqrt[4]{5\left(\frac{x^4-1}{5}\right)+1}$$

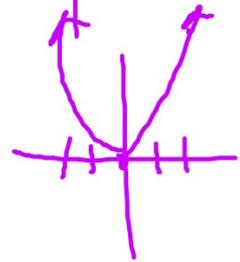
$$= \sqrt[4]{x^4}$$

$$= |x|$$

$$y = x^2$$



$$y = x^4$$



x	y
-2	16
0	0
2	16

3.4 Inverse Functions (continued)

Find the inverse function. -

1) $f(x) = 2x + 3$

$$y = 2x + 3$$

$$x = 2y + \frac{3}{-1}$$

$$\frac{x-3}{2} = \frac{2y}{2}$$

$$\frac{x-3}{2} = y$$

1) Switch the x and y

2) Solve for y

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

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

$$2) \quad g(x) = 3(x-5)^3$$

$$y = 3(x-5)^3$$

$$x = \frac{3(y-5)}{3}$$

$$\sqrt[3]{\frac{x}{3}} = \sqrt[3]{(y-5)^3}$$

$$\sqrt[3]{\frac{x}{3}} = y - 5$$

$$\sqrt[3]{\frac{x}{3}} + 5 = y$$

$$g^{-1}(x) = \sqrt[3]{\frac{x}{3}} + 5$$

$$3.) h(x) = \sqrt[3]{x-4} + 3$$

$$x = \sqrt[3]{y-4} + 3$$
$$(x-3)^3 = (\sqrt[3]{y-4})^3$$

$$(x-3)^3 \neq x^3 - 27$$

$$(x-3)^3 = y-4$$

$$(x-3)^3 + 4 = y$$

$$h^{-1}(x) = (x-3)^3 + 4$$

$$g(x) = x^3 + 1$$

Use the functions to find the indicated values.

$$f(x) = 3x - 1$$

$$g(x) = x^3 + 1$$

$$x = \frac{2}{3}$$

$$\textcircled{4} f^{-1}(11) = \underline{4}$$

↑
y-coord.
for $f(x)$

$$11 = 3x - 1$$

$$4 = x$$

$$\textcircled{5} g^{-1}(28) = \underline{3}$$

$$28 = x^3 + 1$$

$$27 = x^3$$

$$3 = x$$

$$\textcircled{6} (f^{-1} \circ g^{-1})(2)$$

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

$$1 = 3x - 1$$

$$2 = 3x$$

$$\frac{2}{3} = x$$

Find the inverse function.

$$\textcircled{7} f(x) = \frac{x-2}{x+2}$$

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

$$xy + 2x = y - 2$$

$$xy - y = -2x - 2 \quad \left. \vphantom{xy - y} \right\} \text{factor out } y$$

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

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

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

$$\textcircled{8} \quad g(x) = \frac{2x-1}{x+1}$$

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

$$xy + x = 2y - 1$$

$$xy - 2y = -x - 1$$

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

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