

Homework 2.7.8: Inverse Relations (Equations)

Name: Key!

Math 3

Directions: Find the inverse function. Be sure to write the inverse as $f^{-1}(x) =$

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

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

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

$$y(x+2) = 1$$

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

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

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

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

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

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

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

3. $h(x) = 2x^3 + 3$

$$x = 2y^3 + 3$$

$$x - 3 = 2y^3$$

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

$$y = \sqrt[3]{\frac{x-3}{2}}$$

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

4. $g(x) = -4x + 1$

$$x = -4y + 1$$

$$x - 1 = -4y$$

$$\frac{-x+1}{4} = y$$

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

5. $g(x) = \frac{7x+18}{2}$

$$x = \frac{7y+18}{2}$$

$$2x = 7y + 18$$

$$2x - 18 = 7y$$

$$y = \frac{2x-18}{7}$$

$$g^{-1}(x) = \frac{2x-18}{7}$$

6. $f(x) = -x + 3$

$$x = -y + 3$$

$$x - 3 = -y$$

$$-x + 3 = y$$

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

Directions: State if the given functions are inverses. Show all work.

7. $f(x) = x + 6$, $g(x) = x - 6$

$$f(g(x)) = f(x - 6)$$

$$= (x - 6) + 6$$

$$= x \quad \text{yes!}$$

8. $f(x) = \frac{1}{2}x - 7$, $g(x) = 2x + 14$

$$f(g(x)) = f(2x + 14)$$

$$= \frac{1}{2}(2x + 14) - 7$$

$$= x + 7 - 7$$

$$= x \quad \text{yes!}$$

9. $f(x) = 5x + 2$, $g(x) = \frac{x - 2}{5}$

$$f(g(x)) = f\left(\frac{x - 2}{5}\right)$$

$$= 5\left(\frac{x - 2}{5}\right) + 2$$

$$= x - 2 + 2$$

$$= x \quad \text{yes!}$$

10. $f(x) = -3x - 9$, $g(x) = -\frac{1}{3}x - 3$

$$f(g(x)) = f\left(-\frac{1}{3}x - 3\right)$$

$$= -3\left(-\frac{1}{3}x - 3\right) - 9$$

$$= x + 9 - 9$$

$$= x \quad \text{yes!}$$

11. $f(x) = 2x - 7$, $g(x) = \frac{x + 7}{2}$

$$f(g(x)) = f\left(\frac{x + 7}{2}\right)$$

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

$$= x + 7 - 7$$

$$= x \quad \text{yes!}$$

12. $f(x) = -4x + 8$, $g(x) = -\frac{1}{4}x + 2$

$$f(g(x)) = f\left(-\frac{1}{4}x + 2\right)$$

$$= -4\left(-\frac{1}{4}x + 2\right) + 8$$

$$= x - 8 + 8$$

$$= x$$

$$\text{yes!}$$