

Let $f(x) = 3x + 5$, $g(x) = 6 - 2x$, $h(x) = \frac{3}{x}$, and $k(x) = \frac{x-4}{2}$. Evaluate the following.

1) $f(g(3))$

5

2) $g(h(-1))$

12

3) $k(f(-2))$

$-\frac{5}{2}$

4) $h(k(0))$

$-\frac{3}{2}$

Using the functions from above, perform the indicated operation and state the domain.

5) $f(g(x))$ $3(6-2x)+5$

$-6x+23$
 Domain: $(-\infty, +\infty)$

6) $g(h(x))$ $6-2\left(\frac{3}{x}\right)$

$-\frac{6}{x}+6$
 Domain: $(-\infty, 0) \cup (0, +\infty)$

7) $f(k(x))$ $3\left(\frac{x-4}{2}\right)+5$
 $\frac{3x-12+10}{2}$

$\frac{3}{2}x-1$
 Domain: $(-\infty, +\infty)$

8) $g(f(x))$ $6-2(3x+5)$

$-6x-4$
 Domain: $(-\infty, +\infty)$

9) $k(h(x))$ $\frac{\left(\frac{3}{x}\right)-4}{2}$ $\frac{\frac{3}{2x}-2}{2}$
 or $\frac{3-4x}{2x}$

Domain: $(-\infty, 0) \cup (0, +\infty)$

10) $h(k(x))$ $\frac{3}{\left(\frac{x-4}{2}\right)}$ $= \frac{6}{x-4}$

Domain: $(-\infty, 4) \cup (4, +\infty)$

11) $g(k(x))$ $6-2\left(\frac{x-4}{2}\right)$
 $6-x+4$

$-x+10$
 Domain: $(-\infty, +\infty)$

12) $h(h(x))$ $\frac{3}{\left(\frac{3}{x}\right)} = 3\left(\frac{x}{3}\right) = x$

x
 Domain: $(-\infty, 0) \cup (0, +\infty)$

Function Inverses

Find an equation for the inverse relation.

13) $y = 2x - 3$ $x = 2y - 3$

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

14) $f(x) = -x + 6$ $y = -x + 6$
 $x = -y + 6$

$$f^{-1}(x) = -x + 6$$

15) $y = \frac{4}{3} - \frac{1}{3}x$ $x = \frac{4}{3} - \frac{1}{3}y$

$$y = -3x + 4$$

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

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

16) $f(x) = -x$

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

18) $y = x^2$ $\sqrt{x} = \sqrt{y^2}$

$$y = \pm \sqrt{x}$$

Verify that f and g are inverse functions.

19) $f(x) = 4x - 1$ and $g(x) = \frac{1}{4}x + \frac{1}{4}$

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

$x + 1 - 1$
 x

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

21) $f(x) = \frac{1}{x}$ and $g(x) = \frac{1}{x}$

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

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

20) $f(x) = 2 - 5x$ and $g(x) = \frac{2}{5} - \frac{1}{5}x$

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

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

$2 - 2 + x$

x

$\frac{2}{5} - \frac{2}{5} + x$

x

22) $f(x) = x^2 + 1$ and $g(x) = \sqrt{x-1}$

$(\sqrt{x-1})^2 + 1$

$\sqrt{(x^2+1)-1}$

$x - 1 + 1$

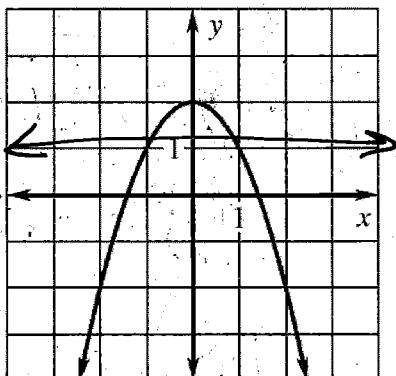
x

$\sqrt{x^2}$

x

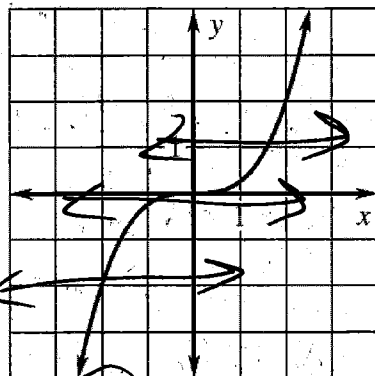
Determine whether the inverse of the graph is a function.

23)



No, fails the h-like test

24)



Yes, passes the h-like test