

Inverse Functions Practice Problems

Name Key
 Period _____ Date _____

1. Find the inverse of the given function.

a. $a(x) = 2x^4 - 3$

$$x = 2y^4 - 3$$

$$\frac{x-3}{2} = y^4$$

$$\sqrt[4]{\frac{x-3}{2}} = y$$

Is the inverse a function on the domain of all real numbers? depends

b. $b(x) = (x+1)^3$

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

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

Is the inverse a function on the domain of all real numbers? yes

c. $c(x) = \frac{1}{x-2} + 4$

$$x = \frac{1}{y-2} + 4$$

$$(y-2)(x-4) = \frac{1}{\cancel{y-2}^{-y-2}}$$

$$y = \frac{1}{x-4} + 2$$

Is the inverse a function on the domain of all real numbers? yes

d. $d(x) = 3 - (x+4)^2$

$$x = 3 - (y+4)^2$$

$$\sqrt{-x+3} = \sqrt{(y+4)^2}$$

$$\sqrt{-x+3} - 4 = y$$

Is the inverse a function on the domain of all real numbers? depends

e. $e(x) = \left(\frac{3}{x} - 1\right)^2$

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

$$\sqrt{x} = \frac{3}{y} - 1$$

$$y(\sqrt{x} + 1) = \frac{3}{x} \cdot x$$

$$\Rightarrow y(\sqrt{x} + 1) = 3$$

$$y = \frac{3}{\sqrt{x} + 1}$$

Is the inverse a function on the domain of all real numbers? depends

f. $f(x) = \frac{4x^3}{5} - 3$

$$x = \frac{4y^3}{5} - 3$$

$$5(x+3) = 4y^3$$

$$\sqrt[3]{\frac{5(x+3)}{4}} = y$$

Is the inverse a function on the domain of all real numbers? yes

g.

x	-3	4	5	-2	9	-1
$f(x)$	5	0	8	-4	0	6

x	5	0	8	-4	0	6
$f^{-1}(x)$	-3	4	5	-2	9	-1

Is the inverse a function on the domain of all real numbers? No

h.

x	-6	0	-4	5	3	
$f(x)$	-1	-4	2	1	0	5

x	5	0	1	2	-4	-1
$f^{-1}(x)$		3	5	-4	0	-6

(Complete both tables above.)

multiple possibilities

2. Verify that f and g are inverses using function composition. Show ALL steps clearly.

a. $f(x) = 1 \pm \sqrt[4]{\frac{2x-5}{4}}$ $g(x) = \frac{4(x-1)^4 + 5}{2}$

$$f(g(x)) = 1 \pm \sqrt[4]{\frac{2\left(\frac{4(x-1)^4 + 5}{2}\right) - 5}{4}}$$

$$= 1 \pm \sqrt[4]{\frac{4(x-1)^4}{4}} = 1 \pm \sqrt[4]{(x-1)^4}$$

$$= 1 \pm x - 1 = x$$

$$g(f(x)) = \frac{4\left(1 \pm \sqrt[4]{\frac{2x-5}{4}} - 1\right)^4 + 5}{2}$$

$$= \frac{4\left(\frac{2x-5}{4}\right) + 5}{2}$$

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

$$f(g(x)) = 1 + \frac{3}{\left(\frac{3}{x-1} + 2\right) - 2}$$

$$= 1 + \frac{3}{\frac{3}{x-1}} = 1 + \frac{3(x-1)}{3}$$

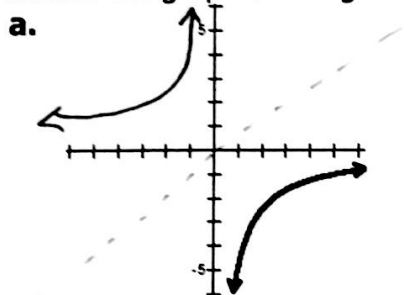
$$= 1 + x - 1 = x$$

$$g(f(x)) = \frac{3}{\left(1 + \frac{3}{x-2}\right) - 1} + 2$$

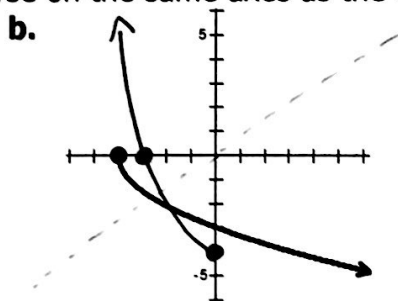
$$= \frac{3}{\frac{3}{x-2}} + 2 = \frac{3(x-2)}{3} + 2$$

$$= x - 2 + 2 = x$$

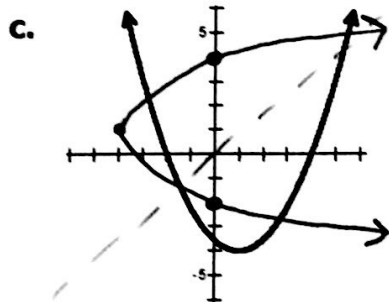
3. Sketch the graph of the given function's inverse on the same axes as the original.



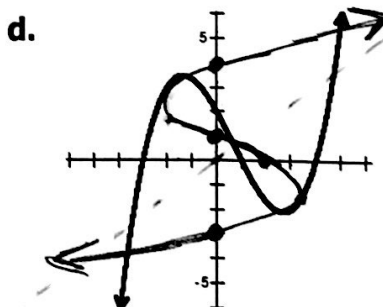
Is the inverse a function on the domain of all real numbers? yes



Is the inverse a function on the domain of all real numbers? yes



Is the inverse a function on the domain of all real numbers? No



Is the inverse a function on the domain of all real numbers? No