Precalculus

Name Cornely ID: 1

Inverse Functions Extra Practice

Date _____ Period ____

State if the given functions are inverses.

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

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

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

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

$x+1-1 = x$

Yes!

2) $f(x) = -\frac{4}{x-2} - 3$

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

$f(g(x))$

$\frac{-4}{\left(\frac{-4}{x+2}+1\right)-2} - 3$

No!

$\frac{-4}{\frac{-4}{x+2}-1} - 3$ → going nowhere

3) $g(x) = \sqrt[3]{x+2}$

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

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

$\sqrt[3]{\sqrt[3]{x}+5} + 1$

No!

cubed root will not "undo" a cube root

4) $f(x) = \frac{8+x}{4}$

$g(x) = 4x - 8$

$f(g(x)) = \frac{8+(4x-8)}{4}$

$\frac{8+4x-8}{4} = \frac{4x}{4} = x$

Yes!

Find the inverse of each function.

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

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

$y(x+2) = \frac{2}{y} \cdot y$

$\frac{y(x+2)}{x+2} = \frac{2}{x+2}$

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

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

6) $f(n) = \frac{-n-4}{4}$

$4 \cdot x = \frac{-y-4}{4} \cdot 4$

$4x = -y - 4$

$4x + 4 = -y$

$y = -4x - 4$

$f^{-1}(n) = -4n - 4$

7) $g(x) = \frac{6 + \sqrt[3]{4x}}{2}$

$2 \cdot x = \frac{6 + \sqrt[3]{4y}}{2} \cdot 2$

$2x = 6 + \sqrt[3]{4y}$

$(2x-6)^3 = (\sqrt[3]{4y})^3$

$\frac{(2x-6)^3}{4} = \frac{4y}{4}$

$g^{-1}(x) = \frac{(2x-6)^3}{4}$

8) $g(x) = -2x^5 + 3$

$x = -2y^5 + 3$

$\frac{x-3}{-2} = \frac{-2y^5}{-2}$

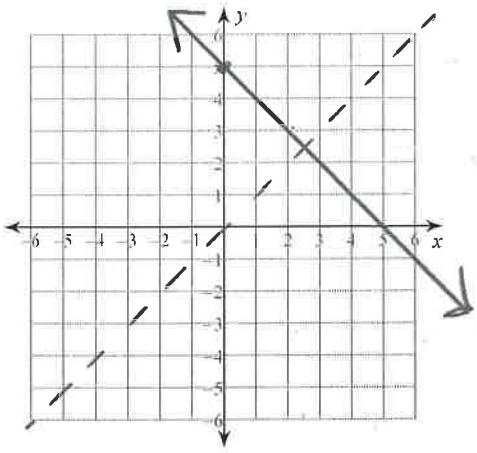
$\sqrt[5]{\frac{x-3}{2}} = \sqrt[5]{y^5}$

$\sqrt[5]{\frac{(x-3)}{2}} = y$

$g^{-1}(x) = \sqrt[5]{\frac{-x+3}{2}}$

Find the inverse of each function. Then graph the function and its inverse.

9) $f(n) = -n + 5$



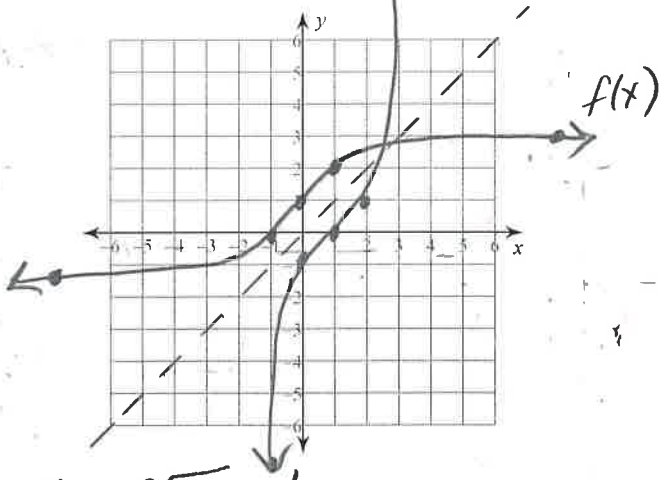
$x = -y + 5$

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

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

This function is its own inverse.

10) $f(x) = \sqrt[3]{x} + 1$



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

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

$(x-1)^3 = y$

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

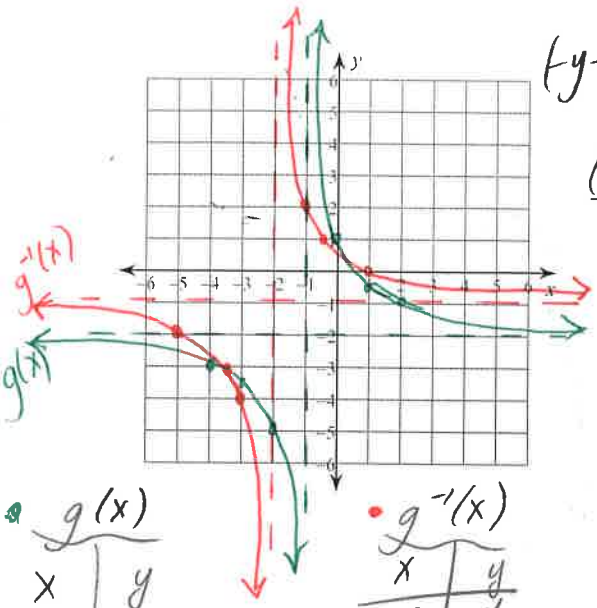
$f(x)$

x	y
-8	-1
-1	0
0	1
1	2
8	3

$f^{-1}(x)$

x	y
-1	-8
0	-1
1	0
2	1
3	8

11) $g(x) = -\frac{3}{-x-1} - 2$



$g(x)$	
x	y
-4	-3
-3	-3.5
-2	-5
0	1
1	-.5
2	-1

$g^{-1}(x)$	
x	y
-3	-4
-3.5	-3
-5	-2
1	0
-.5	1
-1	2

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

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

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

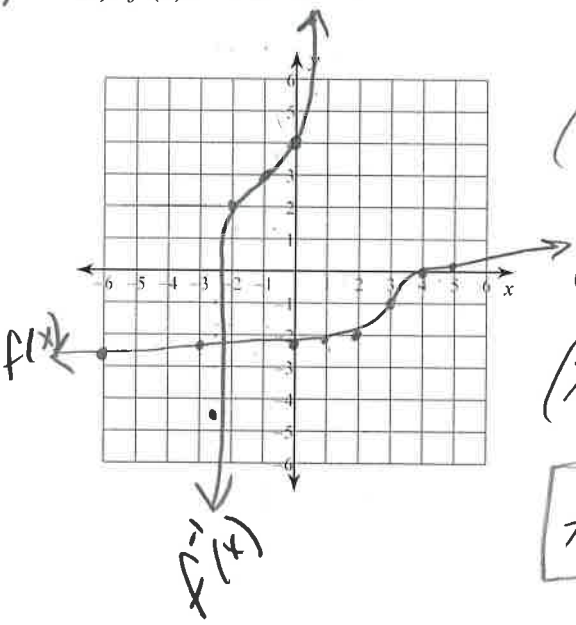
$-y-1 = \frac{-3}{x+2}$

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

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

$\boxed{g^{-1}(x) = \frac{3}{x+2} - 1}$

12) $f(x) = \sqrt[5]{x-3} - 1$



$x = \sqrt[5]{y-3} - 1$

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

$(x+1)^5 = y-3$

$(x+1)^5 + 3 = y$

$\boxed{f^{-1}(x) = (x+1)^5 + 3}$

$f(x)$	
x	y
-6	-2.5
-3	-2.4
0	-2.2
1	-2.1
2	-2
3	-1
4	0
5	2

$f^{-1}(x)$	
x	y
-2	2
-1	3
0	4
.5	10
-2.5	-45

13) $f(n) = \frac{3}{n-2} - 1$

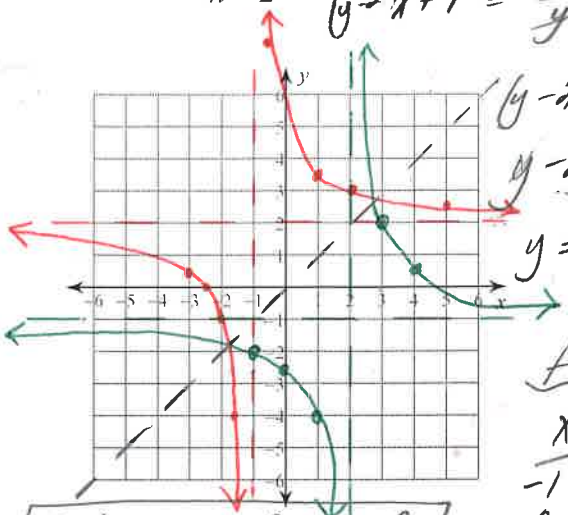
$x = \frac{3}{y-2} - 1$

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

$(y-2)(x+1) = 3$

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

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



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

$f(n)$

x	y
-1	-2
0	-2.5
1	-4
3	2
4	.5

$f^{-1}(n)$

x	y
-3	-.5
-1.5	0
-1	-1
-.5	-4
0	8
1	5
3.5	3

(1, 3)

(5, 1.5)

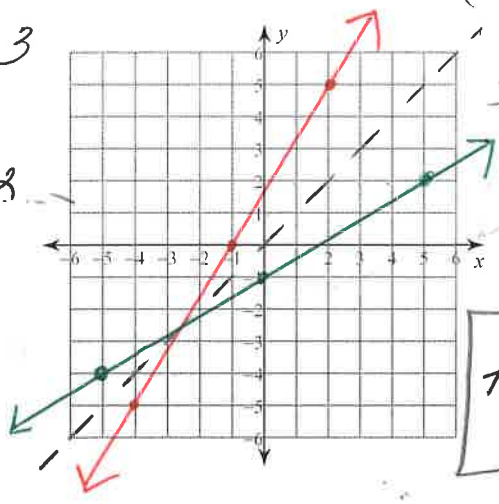
14) $f(x) = -1 + \frac{3}{5}x$

$x = -1 + \frac{3}{5}y$

$5(x+1 = \frac{3}{5}y)$

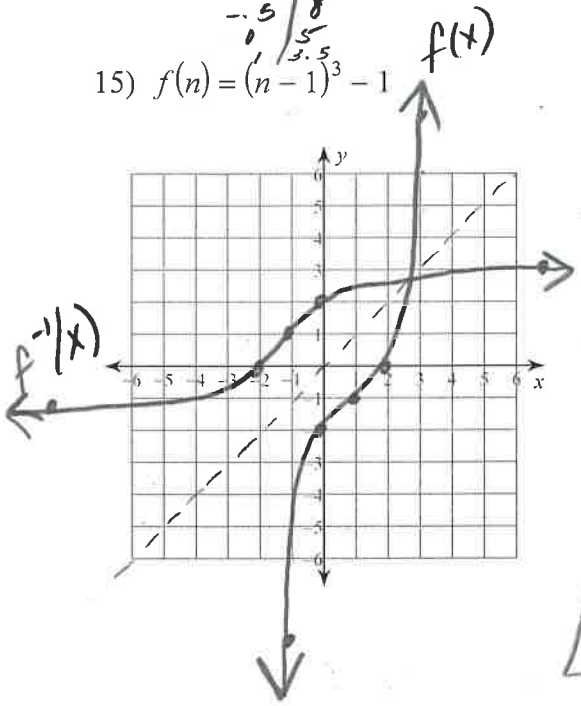
$5x + 5 = 3y$

$\frac{5}{3}x + \frac{5}{3} = y$



$f^{-1}(x) = \frac{5}{3}x + \frac{5}{3}$

15) $f(n) = (n-1)^3 - 1$



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

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

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

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

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

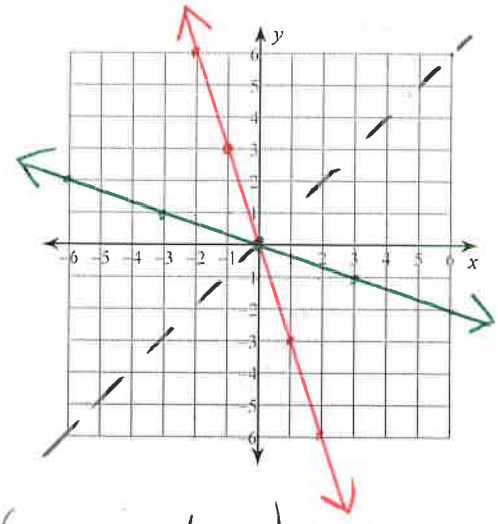
$f(x)$

x	y
-1	-9
0	-2
1	-1
2	0
3	7

$f^{-1}(x)$

x	y
-9	-1
-2	0
-1	1
0	2
7	3

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



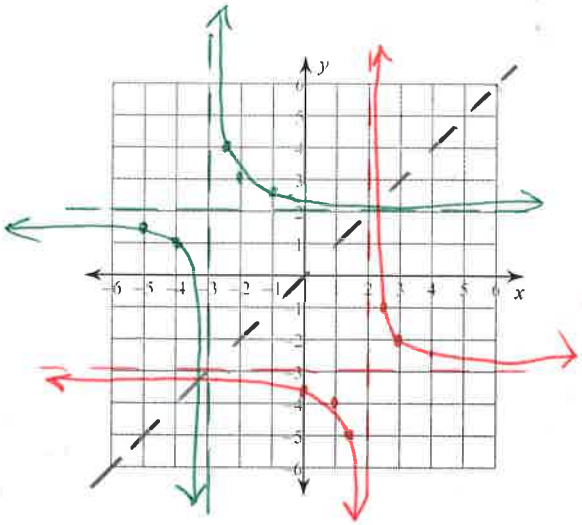
$(x = -\frac{1}{3}y)\,3$

$3x = -y$

$-3x = y$

$g^{-1}(x) = -3x$

17) $g(x) = \frac{1}{x+3} + 2$



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

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

$(y+3)(x-2) = 1$

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

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

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

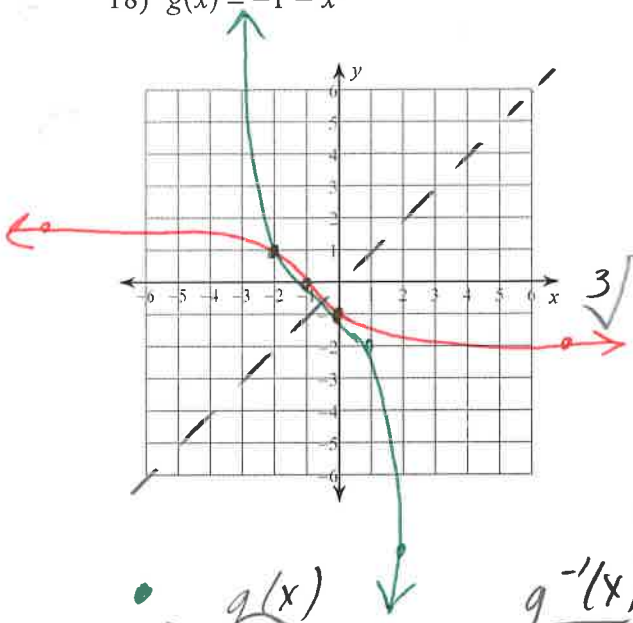
$f(x)$

x	y
-5	1.5
-4	1
-3.5	0
-2.5	4
-2	3
-1	2.5

$f^{-1}(x)$

x	y
1.5	-5
1	-4
0	-3.5
4	-2.5
3	-2
2.5	-1

18) $g(x) = -1 - x^3$



$$x = -1 - y^3$$

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

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

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

- $g(x)$

x	y
-2	0
-1	-1
0	-2
1	-9
2	-9

$g^{-1}(x)$

x	y
7	-2
0	-1
-1	0
-2	1
-9	9

Answers to Inverse Functions Extra Practice (ID: 1)

1) Yes

2) No

3) No

4) Yes

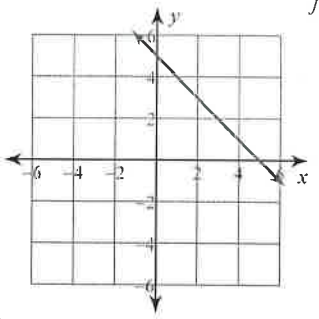
5) $f^{-1}(x) = -\dfrac{2}{-x-2}$

6) $f^{-1}(n) = -4n - 4$

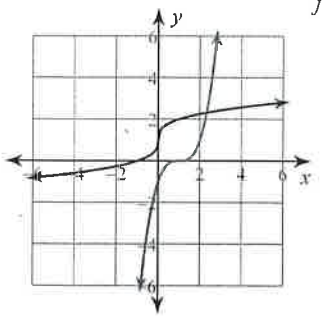
7) $g^{-1}(x) = 2(x-3)^3$

8) $g^{-1}(x) = \sqrt[5]{\dfrac{-x+3}{2}}$

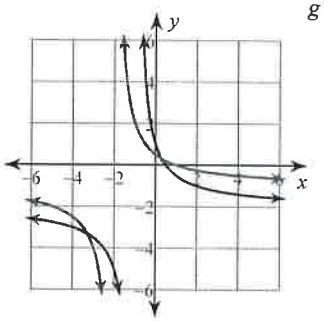
9) $f^{-1}(n) = -n + 5$



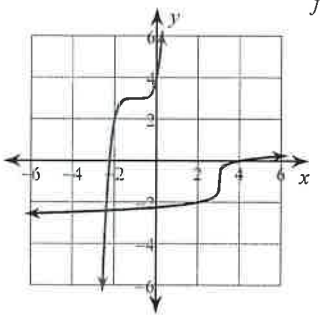
10) $f^{-1}(x) = (x-1)^3$



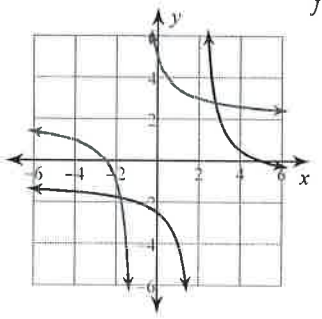
11) $g^{-1}(x) = \dfrac{3}{x+2} - 1$



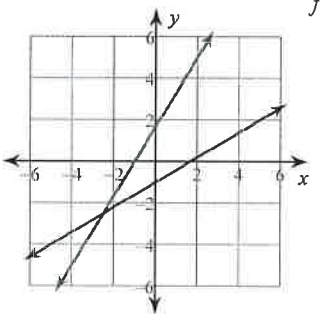
12) $f^{-1}(x) = (x+1)^5 + 3$



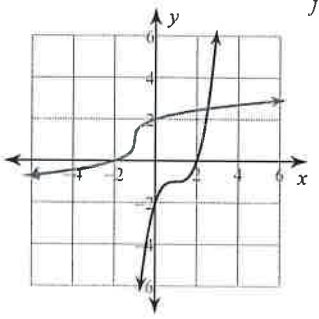
13) $f^{-1}(n) = \dfrac{3}{n+1} + 2$



14) $f^{-1}(x) = \dfrac{5}{3}x + \dfrac{5}{3}$



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



16) $g^{-1}(x) = -3x$