Name: _____ Period: _____ Date: _____

Inverse Relations and Functions Assignment

Find the inverse of each relation.

1. $y = 4x$

x	1	-1	2	-2
y	4	-4	8	-8

x				
y				

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

x	0	1	2	-1
y	-3	-1	5	-1

x				
y				

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

x	2	4	6	8
y	1	2	3	4

x				
y				

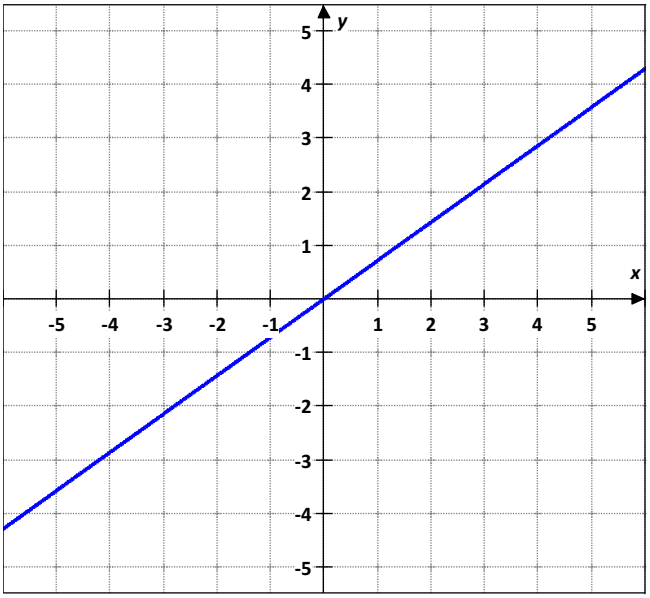
4. $y = |2x|$

x	0	1	2	-1
y	0	2	4	2

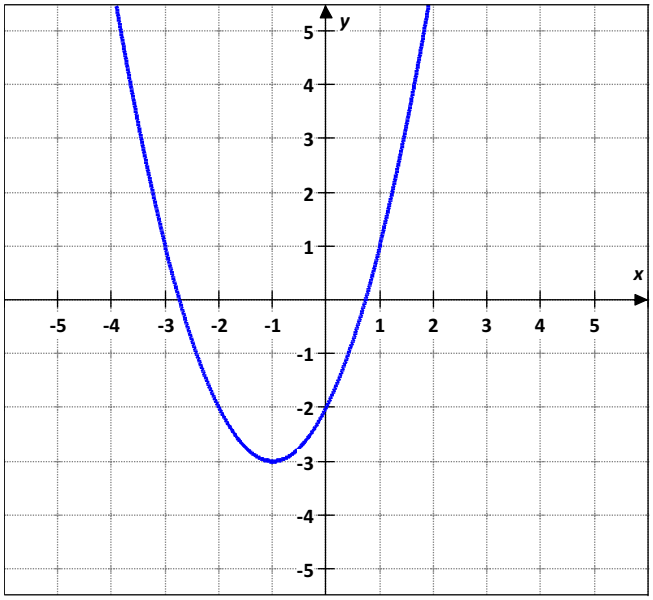
x				
y				

Use a horizontal line test to determine whether of the graph of each function is a one-to-one function.

5. $f(x) = \frac{5x}{7}$



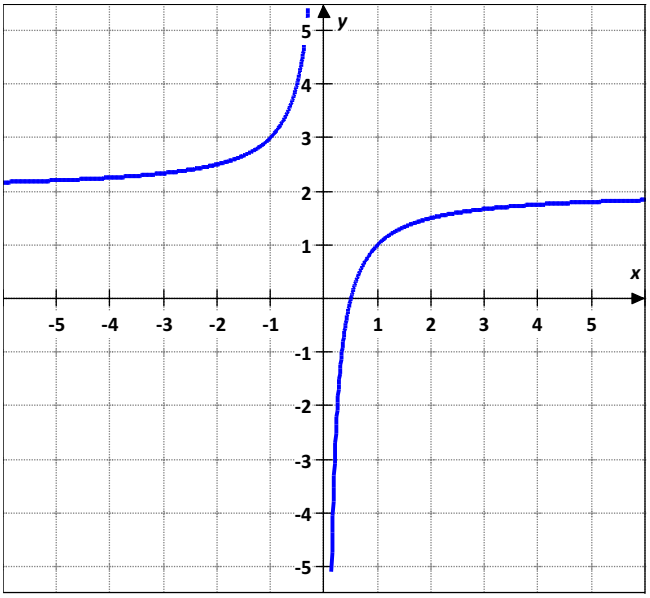
6. $f(x) = x^2 + 2x - 2$



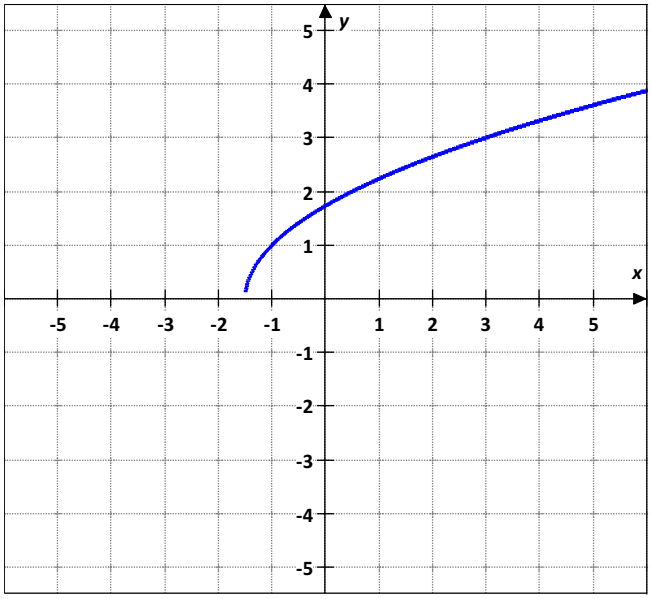
Name: _____ Period: _____ Date: _____

Inverse Relations and Functions Assignment

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



8. $g(x) = \sqrt{2x + 3}$



Find an equation for the inverse of each of the one to one function.

9. $f(x) = 6x - 4$

10. $f(x) = 5x^3 + 2$

Name: _____ Period: _____ Date: _____

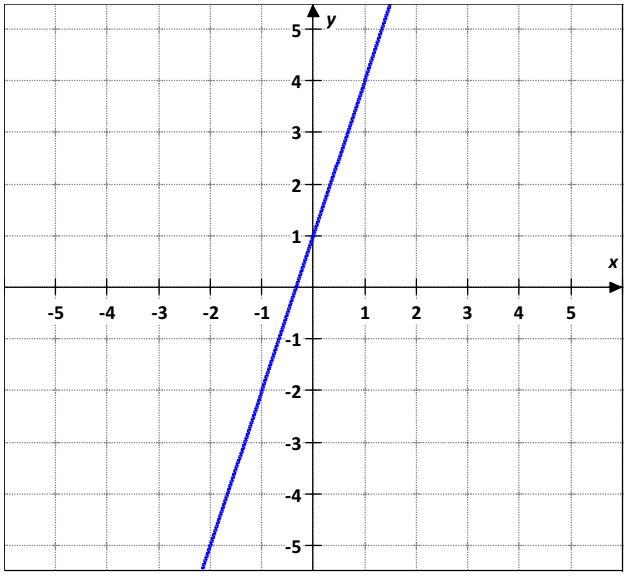
Inverse Relations and Functions Assignment

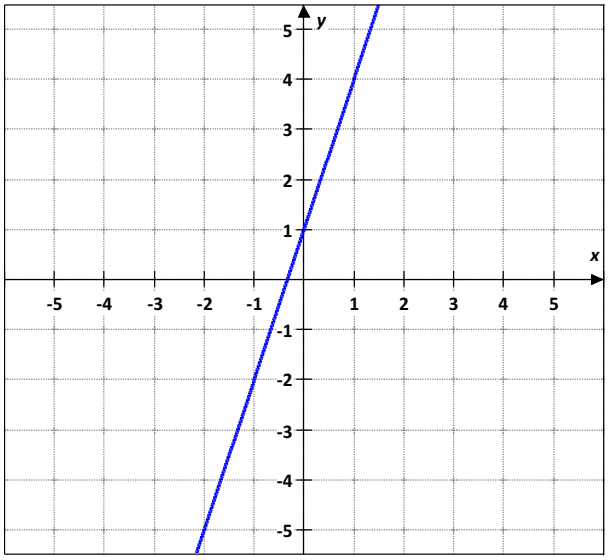
Use the graph of each function to graph its inverse function.

13. $f(x) = 3x + 1$

x	-1	0	1	2
y	-2	1	4	7

x				
y				

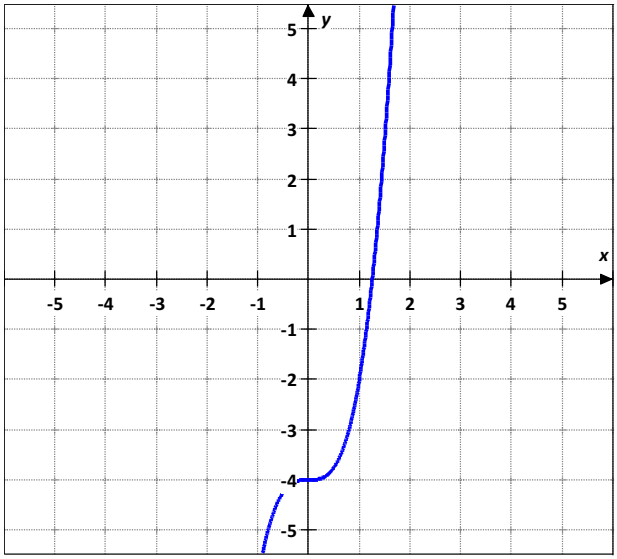


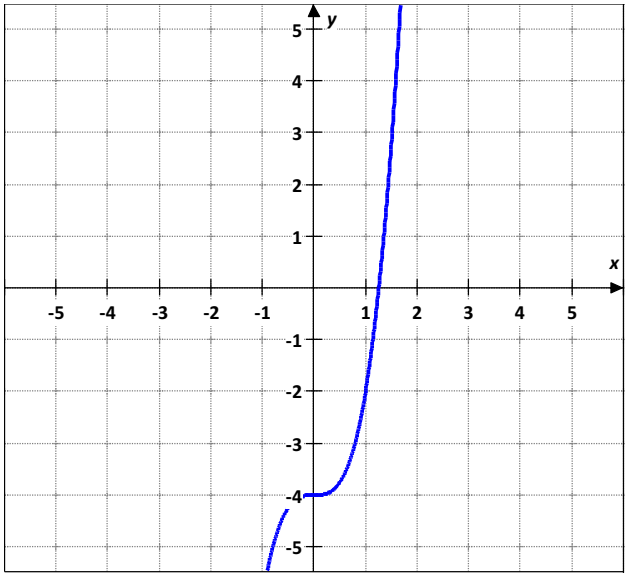


14. $f(x) = 2x^3 - 4$

x	-1	0	1	2
y	-6	-4	-2	12

x				
y				



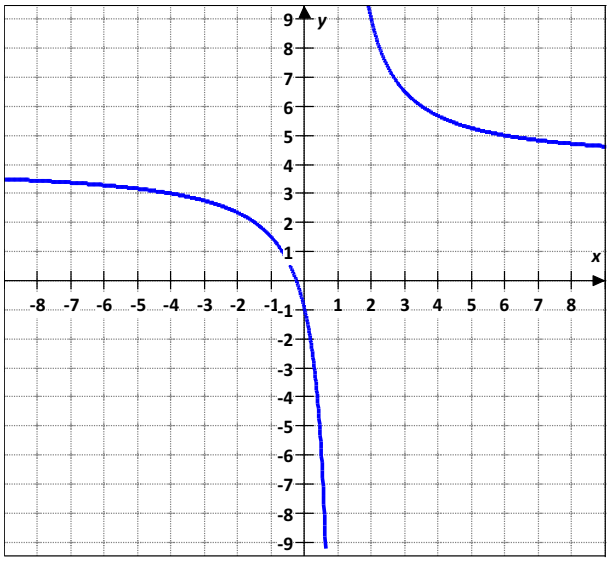


Name: _____ Period: _____ Date: _____

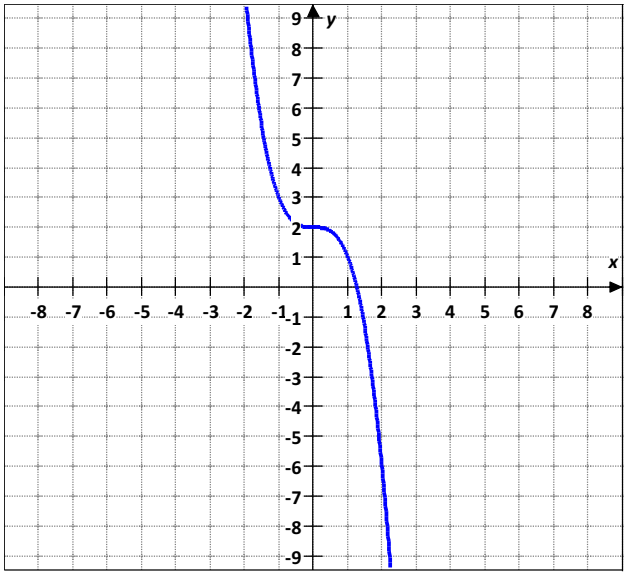
Inverse Relations and Functions Assignment

Determine whether each function has an inverse function. If it does, find the inverse function and state any restrictions on its domain.

15. $f(x) = \dfrac{4x+1}{x-1}$



16. $f(x) = -x^3 + 2$



Name: _____ Period: _____ Date: _____

Inverse Relations and Functions Assignment

Show algebraically that f and g are inverse functions.

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

18. $f(x) = \sqrt{x-1} + 3$
$g(x) = (x-3)^2 + 1 \quad x \geq 3$

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

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

Name: _____ Period: _____ Date: _____

Inverse Relations and Functions Assignment

ANSWERS

Find the inverse of each relation.

1. $y = 4x$

x	1	-1	2	-2
y	4	-4	8	-8

x	4	-4	8	-8
y	1	-1	2	-2

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

x	0	1	2	-1
y	-3	-1	5	-1

x	-3	-1	5	-1
y	0	1	2	-1

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

x	2	4	6	8
y	1	2	3	4

x	1	2	3	4
y	2	4	6	8

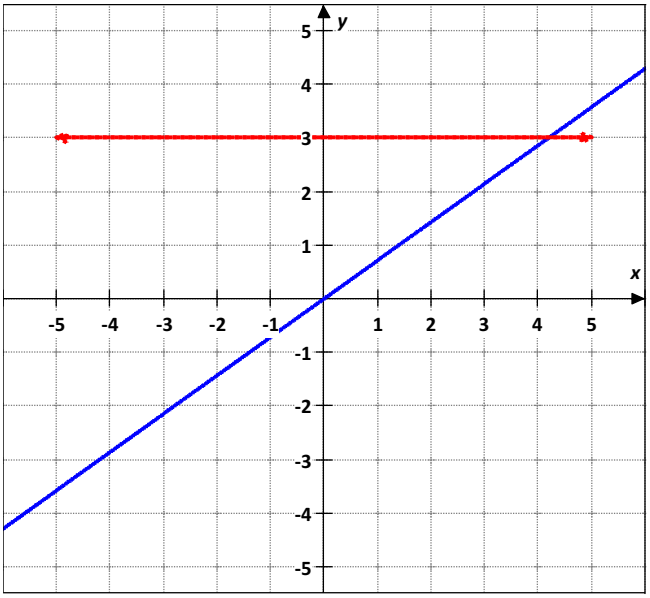
4. $y = |2x|$

x	0	1	2	-1
y	0	2	4	2

x	0	2	4	2
y	0	1	2	-1

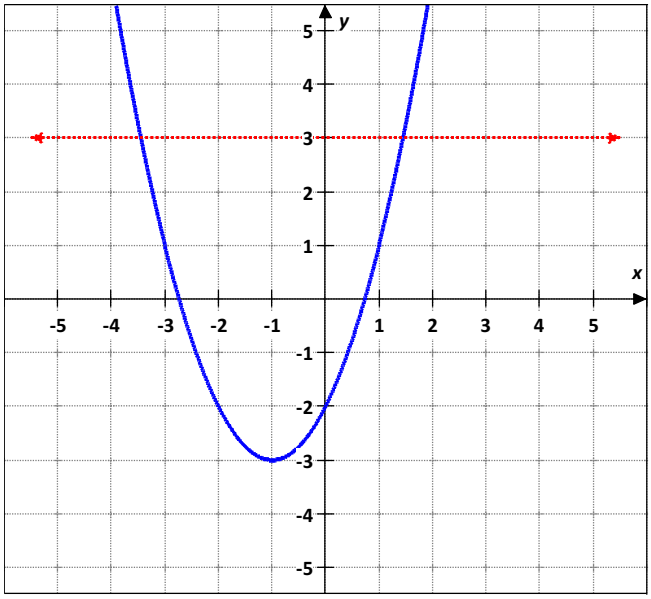
Use a horizontal line test to determine whether of the graph of each function is a one-to-one function.

5. $f(x) = \frac{5x}{7}$



$f(x) = \frac{5x}{7}$ is a one − to − one function.

6. $f(x) = x^2 + 2x - 2$

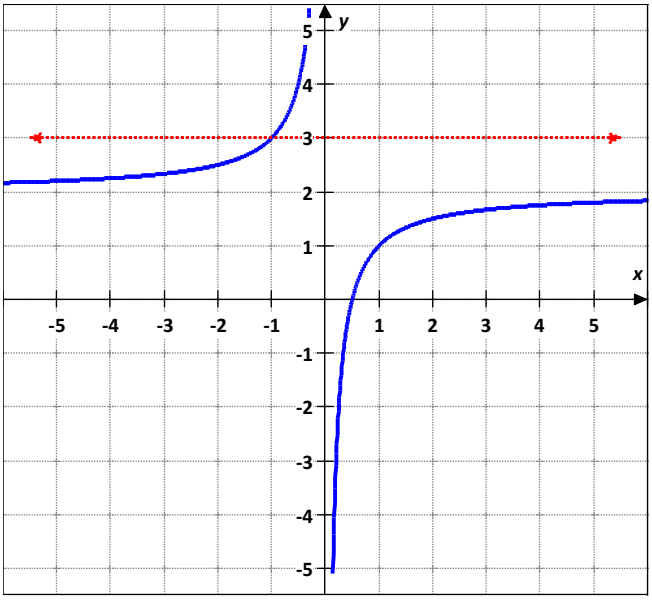


$f(x) = x^2 + 2x - 2$ is not a one − to − one function.

Name: _____ Period: _____ Date: _____

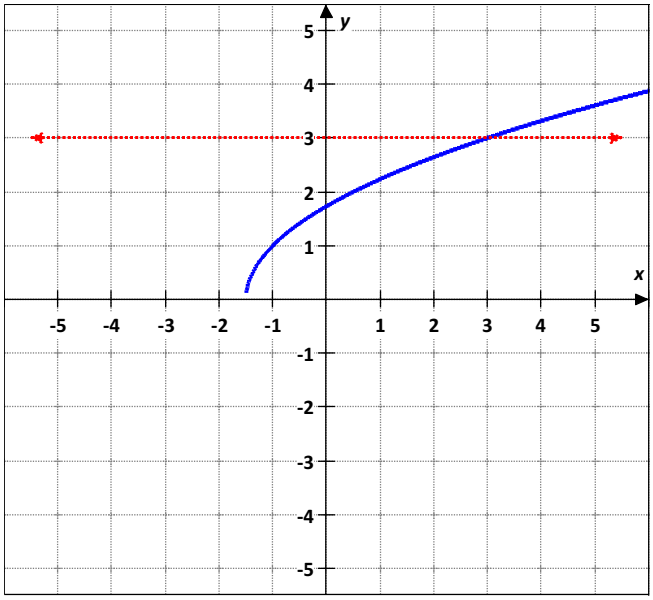
Inverse Relations and Functions Assignment

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



$h(x) = 2 - \frac{1}{x}$ is a one − to − one function.

8. $g(x) = \sqrt{2x + 3}$



$g(x) = \sqrt{2x + 3}$ is a one − to − one function.

Find an equation for the inverse of each of the one to one function.

9. $f(x) = 6x - 4$

$f(x) = 6x - 4$

$y = 6x - 4$
$x = 6y - 4$
$x + 4 = 6y - 4 + 4$
$x + 4 = 6y$
$\frac{x + 4}{6} = y$
$f^{-1}(x) = \frac{x + 4}{6}$

10. $f(x) = 5x^3 + 2$

$f(x) = 5x^3 + 2$

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

Name: _____ Period: _____ Date: _____

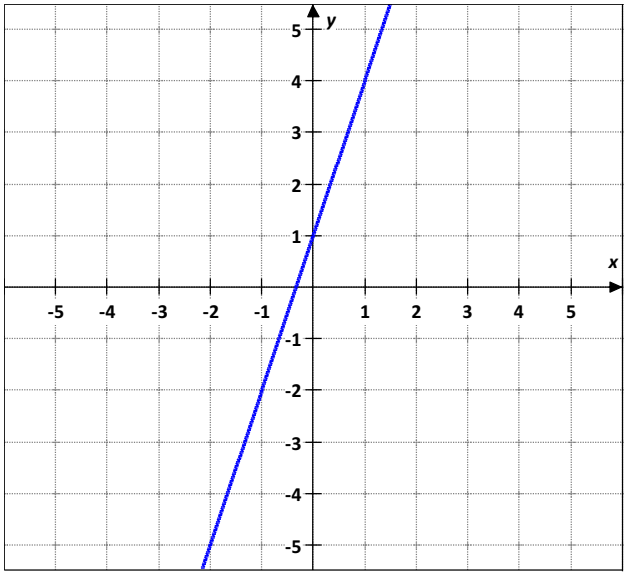
Inverse Relations and Functions Assignment

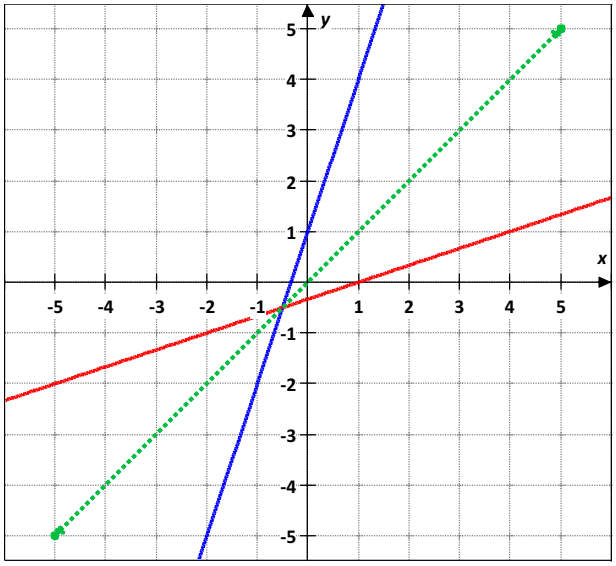
Use the graph of each function to graph its inverse function.

13. $f(x) = 3x + 1$

x	-1	0	1	2
y	-2	1	4	7

x	-2	1	4	7
y	-1	0	1	2

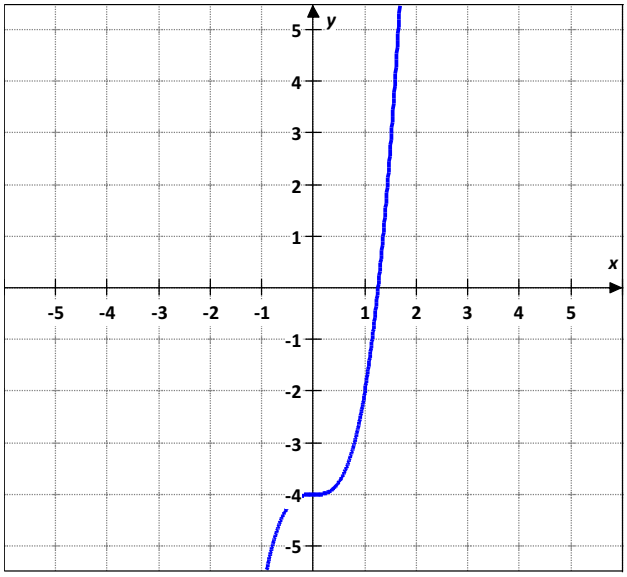


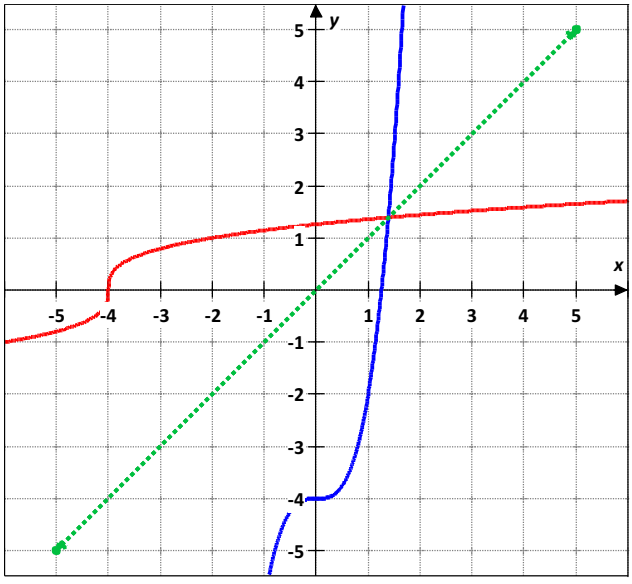


14. $f(x) = 2x^3 - 4$

x	-1	0	1	2
y	-6	-4	-2	12

x	-6	-4	-2	12
y	-1	0	1	2



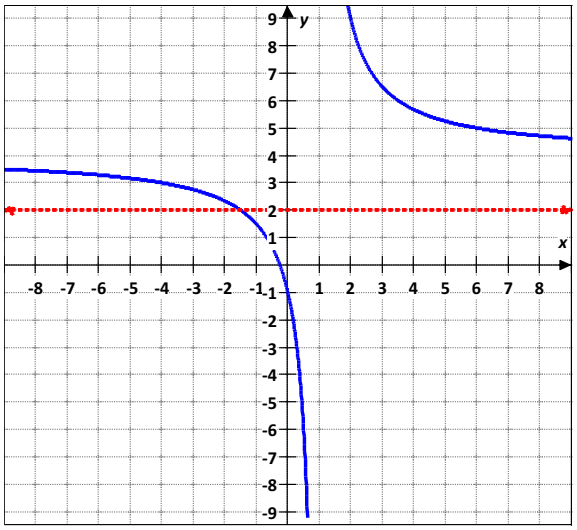


Name: _____ Period: _____ Date: _____

Inverse Relations and Functions Assignment

Determine whether each function has an inverse function. If it does, find the inverse function and state any restrictions on its domain.

15. $f(x) = \dfrac{4x+1}{x-1}$



$f(x) = \dfrac{4x+1}{x-1}$ is a one − to − one function.

Therefore the inverse of $f(x) = \frac{4x+1}{x-1}$ is a function.

$f(x) = \dfrac{4x+1}{x-1} \quad x \neq 1$

$D = (-\infty, 1) \cup (1, \infty) \qquad R = (-\infty, 4) \cup (4, \infty)$

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

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

$x(y-1) = 4y+1$

$xy - x = 4y + 1$

$xy - 4y = x + 1$

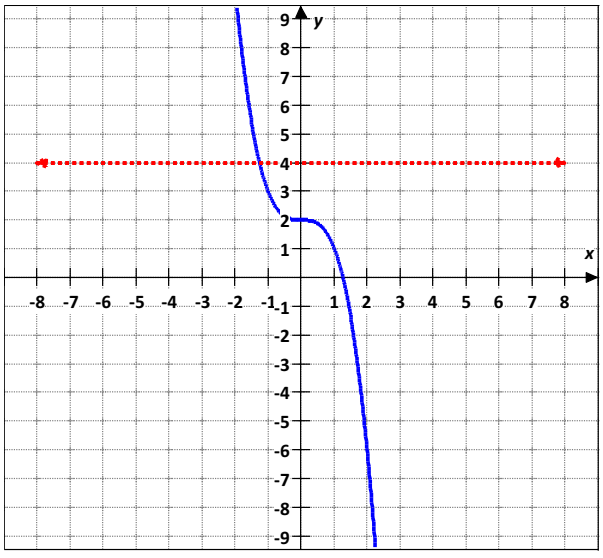
$y(x-4) = x + 1$

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

$f^{-1}(x) = \dfrac{x+1}{x-4} \quad x \neq 4$

$D = (-\infty, 4) \cup (4, \infty) \qquad R = (-\infty, 1) \cup (1, \infty)$

16. $f(x) = -x^3 + 2$



$f(x) = -x^3 + 2$ is a one − to − one function.

Therefore the inverse of $f(x) = -x^3 + 2$ is a function.

$f(x) = -x^3 + 2 \qquad D = (-\infty, \infty) \quad R = (-\infty, \infty)$

$y = -x^3 + 2$

$x = -y^3 + 2$

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

$x - 2 = -y^3$

$y^3 = 2 - x$

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

$f^{-1}(x) = \sqrt[3]{2-x} \quad D = (-\infty, \infty) \quad R = (-\infty, \infty)$

Name: _____ Period: _____ Date: _____

Inverse Relations and Functions Assignment

Show algebraically that f and g are inverse functions.

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

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

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

$f(g(x)) = \frac{3x}{3}$

$f(g(x)) = x$

$g(f(x)) = 3 * f(x) - 2$

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

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

$g(f(x)) = x$

18. $f(x) = \sqrt{x-1} + 3$

$g(x) = (x-3)^2 + 1 \qquad x \geq 3$

$f(g(x)) = \sqrt{g(x)-1} + 3$

$f(g(x)) = \sqrt{(x-3)^2 + 1 - 1} + 3$

$f(g(x)) = \sqrt{(x-3)^2} + 3$

$f(g(x)) = (x-3) + 3$

$f(g(x)) = x$

$g(f(x)) = (f(x)-3)^2 + 1$

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

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

$g(f(x)) = x - 1 + 1$

$(f(x)) = x$

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

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

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

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

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

$f(g(x)) = x$

$g(f(x)) = \frac{2+3*f(x)}{f(x)}$

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

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

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

$g(f(x)) = x$

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

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

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

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

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

$f(g(x)) = x$

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

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

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

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

$g(f(x)) = x$