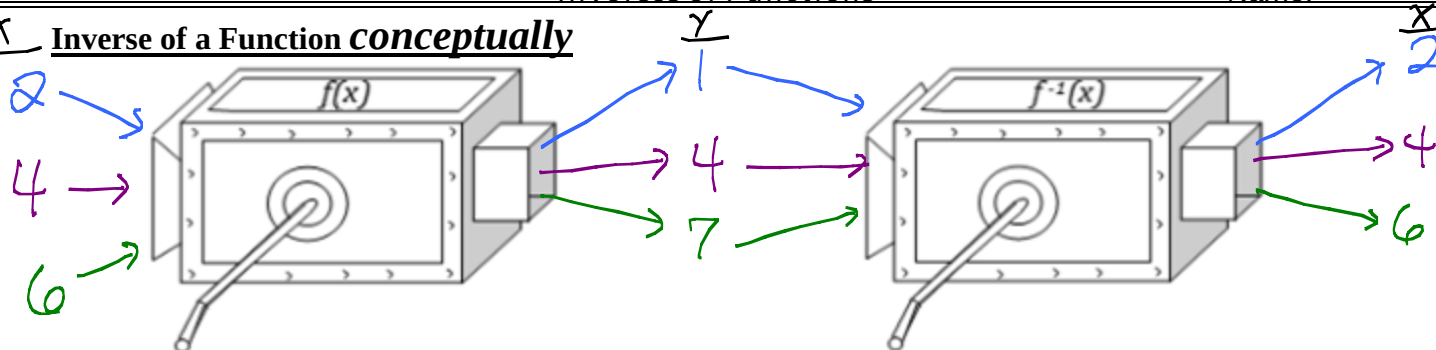


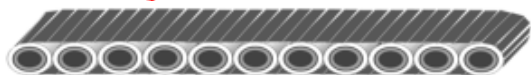
Inverse of a Function conceptually



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

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

$$\rightarrow *3 \rightarrow -4 \rightarrow \div 2 \rightarrow$$



$$x \rightarrow *2 \rightarrow +4 \rightarrow \div 3 \rightarrow$$



$$f^{-1}(x) = \frac{2x+4}{3}$$

1. Find the inverse functions of the following.

a. $f(x) = 5x + 3$

b. $g(x) = \frac{3x+1}{5}$

$$f(x): \rightarrow *5 \rightarrow +3 \rightarrow$$

$$g(x): \rightarrow *3 \rightarrow +1 \rightarrow \div 5 \rightarrow$$

$$f^{-1}(x): \rightarrow -3 \rightarrow \div 5 \rightarrow$$

$$g^{-1}(x): \rightarrow *5 \rightarrow -1 \rightarrow \div 3 \rightarrow$$

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

$$g^{-1}(x) = 5x - 1$$

c. $h(x) = \frac{x}{2} - 6$

d. $g(x) = 2x^3 + 6$

$$h(x): \rightarrow \div 2 \rightarrow -6 \rightarrow$$

$$g(x): \rightarrow \wedge 3 \rightarrow *2 \rightarrow +6 \rightarrow$$

$$h^{-1}(x): \rightarrow +6 \rightarrow *2 \rightarrow$$

$$g^{-1}(x): \rightarrow -6 \rightarrow \div 2 \rightarrow \sqrt[3]{} \rightarrow$$

$$h^{-1}(x) = (x+6)2$$

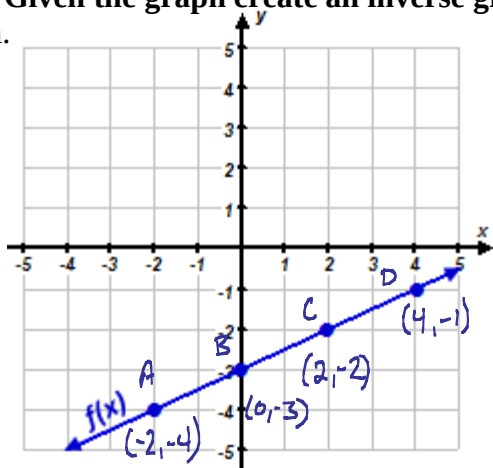
$$g^{-1}(x) = \sqrt[3]{\frac{x-6}{2}}$$

$$h^{-1}(x) = 2(x+6)$$

$x \leftrightarrow y$

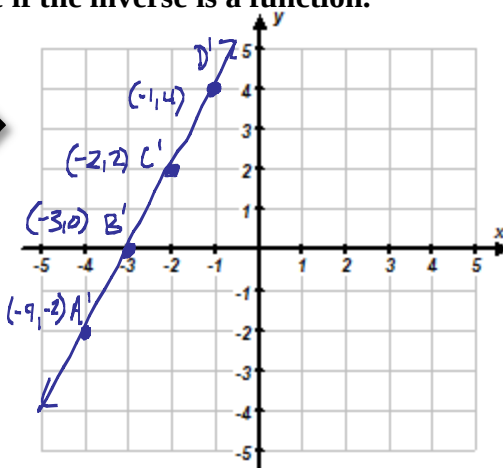
2. Given the graph create an inverse graph and determine if the inverse is a function.

a.

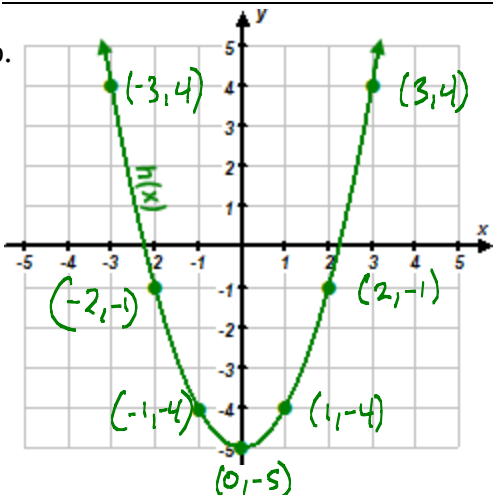


Create an inverse of the graph shown

Is the inverse a function?
CIRCLE ONE:
☒ YES ☐ NO

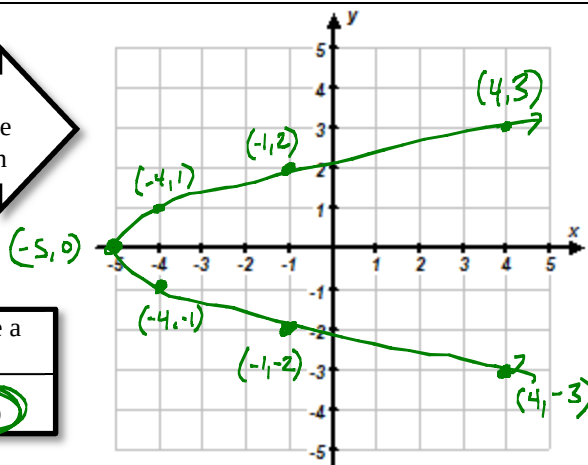


b.

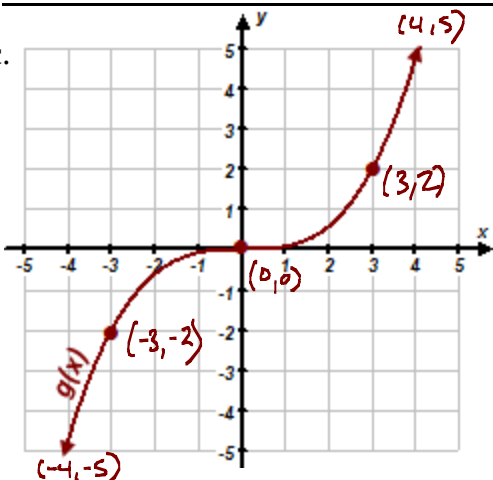


Create an inverse of the graph shown

Is the inverse a function?
CIRCLE ONE:
☐ YES ☒ NO

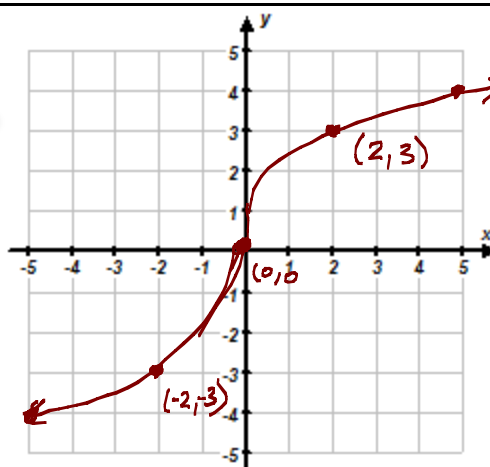


c.

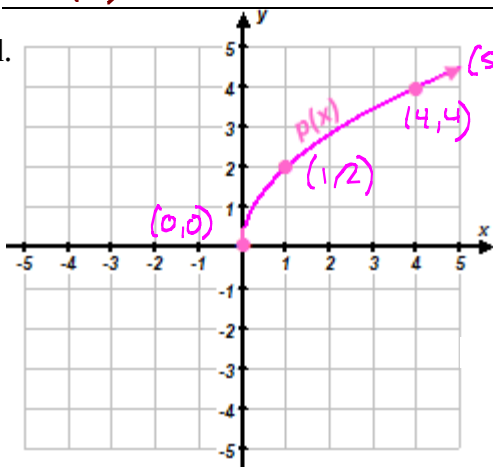


Create an inverse of the graph shown

Is the inverse a function?
CIRCLE ONE:
☒ YES ☐ NO

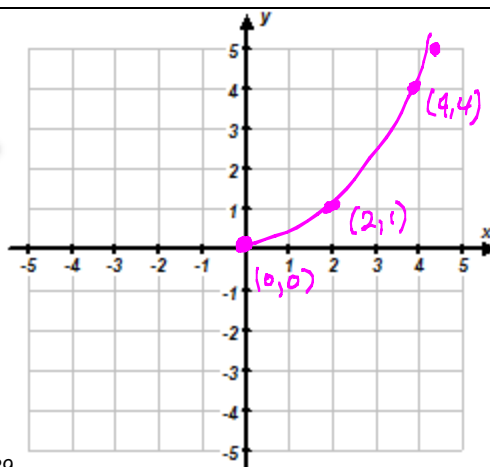


d.



Create an inverse of the graph shown

Is the inverse a function?
CIRCLE ONE:
☒ YES ☐ NO



3. Which two functions could be inverses of one another based on the partial set of values in the table?

x	f(x)
-2	0
-1	2
0	-2
2	-1

$(x, y) \rightarrow (y, x)$
 $(x, y) \rightarrow (y, x)$
 $\rightarrow$

x	g(x)
0	-2
2	-1
-2	0
-1	2

$f(x) \neq g(x)$
 $f(x) \neq g(x)$
 ARE INVERSES.

x	h(x)
-2	-1
-1	-2
0	2
2	0

4. Find the inverse functions of the following using the $x \leftrightarrow y$ flip technique.

a. $g(x) = \frac{3x+1}{5}$

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

$5 \cdot X = \left[\frac{3y+1}{5} \right] \cdot 5$: SOLVE FOR Y

$5x = 3y+1$
 -1

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

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

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

b. $h(x) = \frac{3}{2x+1}$; $x \neq -\frac{1}{2}$

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

$(2y+1)X = \frac{3}{2y+1}$: SOLVE FOR Y

$2yx + x = 3$
 $-x$

$\frac{2xy}{2x} = \frac{3-x}{2x}$

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

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

c. $f(x) = \frac{x+3}{x-2}$; $x \neq 2$

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

$(y-2) \cdot X = \frac{y+3}{y-2} \cdot (y-2)$: SOLVE FOR Y

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

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

$yx - y = 3+2x$

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

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

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

d. $m(x) = \frac{2x-3}{3x+1}$; $x \neq -\frac{1}{3}$

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

$(3y+1)X = \frac{2y-3}{3y+1} \cdot (3y+1)$: SOLVE FOR Y

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

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

$3yx - 2y = -3-x$

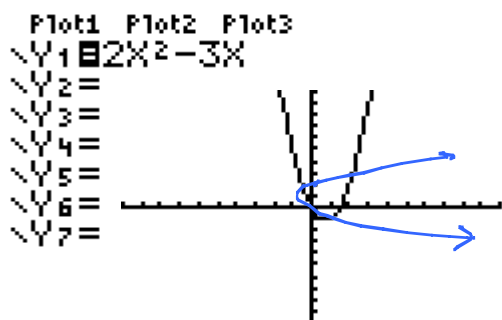
$y \cdot (3x-2) = \frac{-3-x}{3x-2}$

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

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

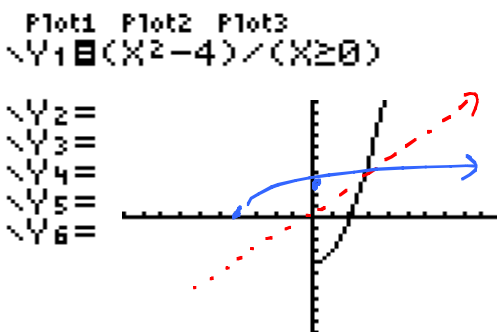
5. Find the inverse functions of the following using any method:

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



THE INVERSE
IS NOT A
FUNCTION

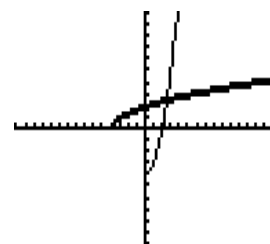
b. $g(x) = x^2 - 4$; $x \geq 0$



$g(x)$: $\rightarrow +2 \rightarrow -4 \rightarrow$

$g^{-1}(x)$: $\rightarrow +4 \rightarrow \sqrt{} \rightarrow$

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



6. Verify which of the following are inverses of one another by considering $f(g(x))$ and $g(f(x))$

$f(x) = 4x$

a. $g(x) = \frac{x}{4}$

$f(g(x)) = f\left(\frac{x}{4}\right) = 4\left(\frac{x}{4}\right) = x \checkmark$

$g(f(x)) = g(4x) = \frac{4x}{4} = x \checkmark$

$f(x)$ AND $g(x)$ ARE INVERSES.

$f(x) = 2x+1$

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

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

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

$f(x)$ AND $g(x)$ ARE INVERSES.

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

$g(x) = 2x+3$

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

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

$= x + 1.5 - 3 = x - 1.5$

IN THIS EXAMPLE
 $f(x) \neq g(x)$ ARE
NOT INVERSES.

NOT
JUST
"X"

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

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

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

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

$f(x)$ AND $g(x)$
ARE
INVERSES.