AGS 2
Module 4.4 & 4.5 Notes

Name Key
Period

If a function $f(x)$ has a domain = set A and a range = set B, then the inverse function $f^{-1}(x)$ has a domain = set B and a range = set A. The x and y values are reversed.

Find the inverse of each relation shown below. Determine whether the inverse is a function or not. If not, why not? Be specific.

1.

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

*switch x and y

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

this is a function. each x-value has only one y-value.

2. $f(x) = \{(-1,4), (0,3), (1,4), (2,3)\}$

$f^{-1}(x) = \{(4,-1), (3,0), (4,1), (3,2)\}$ this is not a function because the x-values have more than one corresponding y-value.

How to find the inverse of a function:
STEP 1: Stick a "y" in for the "f(x)."
STEP 2: Switch the x and y.
STEP 3: Solve for y.
STEP 4: Stick $f^{-1}(x)$ in for the "y." THEN, CHECK IT!

Find the inverse of each function.

3. $f(x) = -2x + 5$

$y = -2x + 5$ ← original

$x = -2y + 5$ ← inverse

$-5 \qquad -5$

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

$y = \frac{1x - 5}{-2}$

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

4. $f(x) = \sqrt{x+7}$

$y = \sqrt{x+7}$ ← original

$x^2 = \sqrt{y+7}^2$ ← inverse

$x^2 = y + 7$

$-7 \qquad -7$

$y = x^2 - 7$

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

Find the inverse of each function.

5. $f(x) = x^3 - 6$

1. $y = x^3 - 6$
2. $x = y^3 - 6$
3. $+6 \quad +6$

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

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

4. $\boxed{f^{-1}(x) = \sqrt[3]{x+6}}$

6. $f(x) = \frac{2x+1}{3}$

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

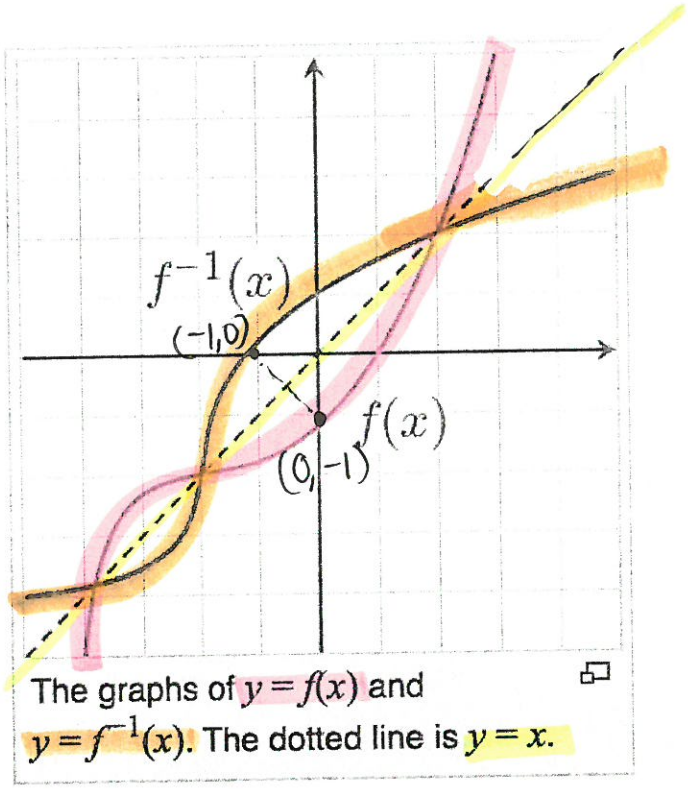
$-1 \quad -1$

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

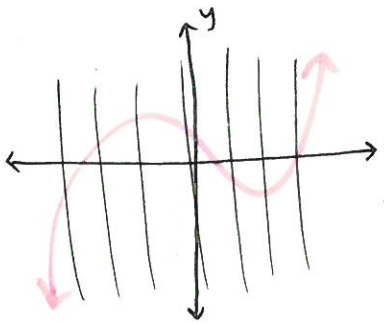
$\frac{3x}{2} - \frac{1}{2}$

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

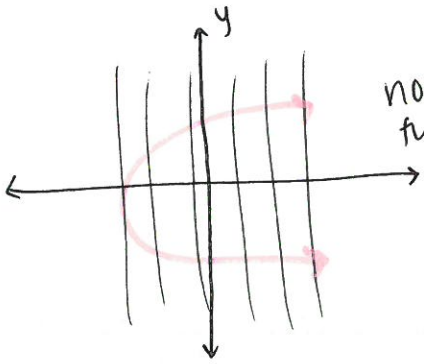
To find the graph of an inverse, switch the x and y values for each key point. Your 2 graphs will reflect over the *line* $y = x$.



The graphs of $y = f(x)$ and $y = f^{-1}(x)$. The dotted line is $y = x$.

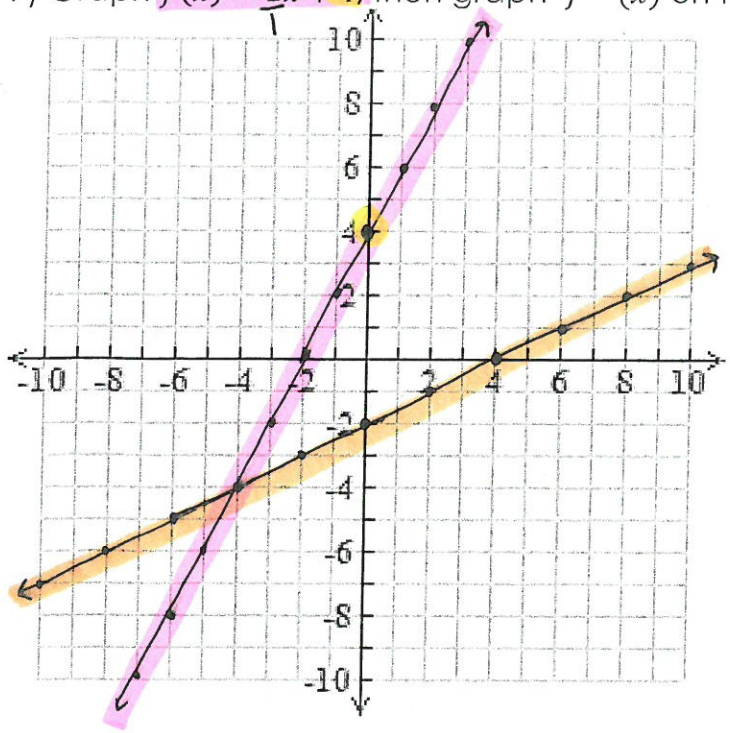


function ✓



not a function ✗

7) Graph $f(x) = \frac{2}{1}x + 4$, then graph $f^{-1}(x)$ on the same axis.



2 options:

1) pick out coordinates + flip them
2) find the inverse equation + graph

$f(x) = 2x + 4$

$y = 2x + 4$

$x = 2y + 4$

$-4 \quad -4$

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

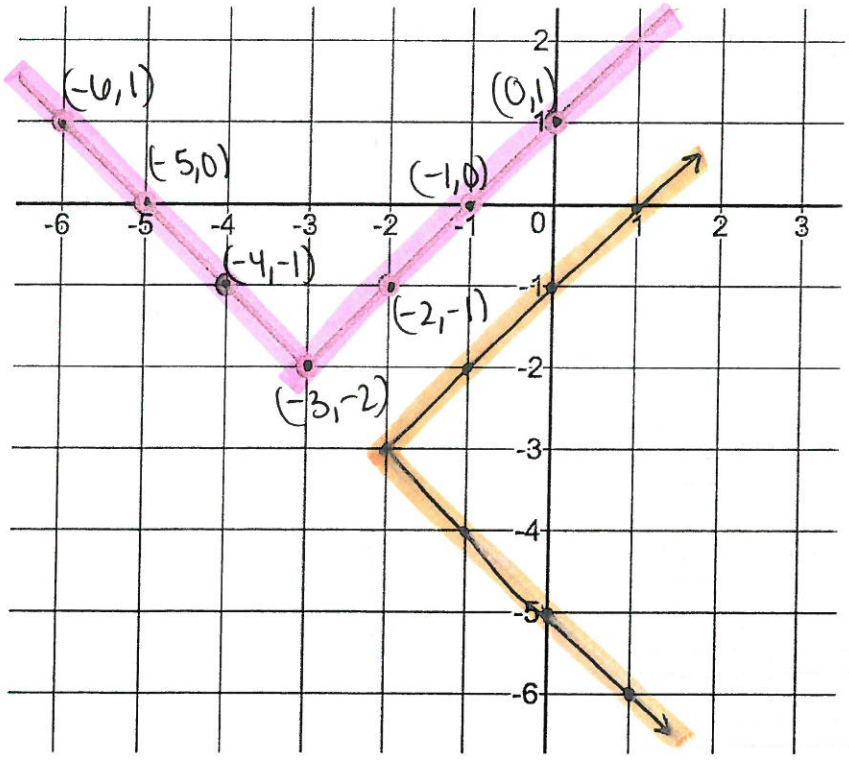
up 1 over 2

start here

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

Use the graph of $f(x)$ to complete the table for $f^{-1}(x)$.

3)



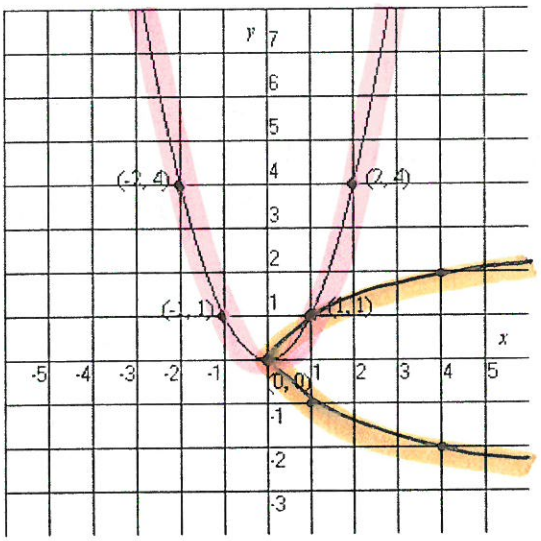
x	~~f(x)~~ $f^{-1}(x)$
1	-6
0	-5
-1	-4
-2	-3
-1	-2
0	-1
1	0

$f(x)$ is a function.

$f^{-1}(x)$ is not a function.

$f(x)$ is a function, $f^{-1}(x)$ is not a function

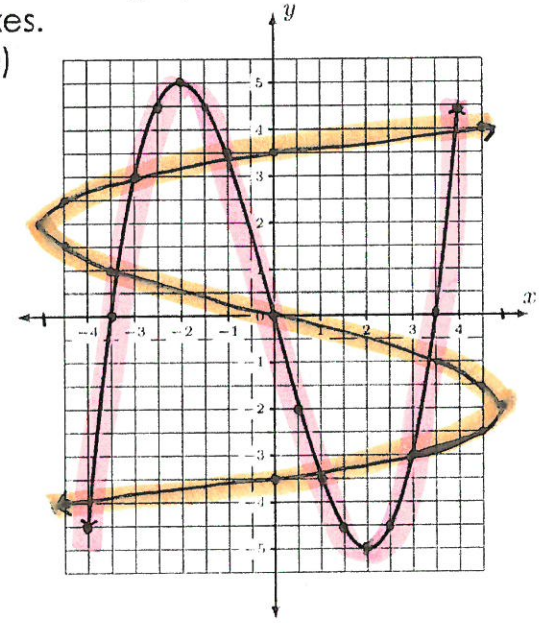
9)



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

Given the graph of the relation, sketch the graph of its inverse on the same set of coordinate axes.

10)

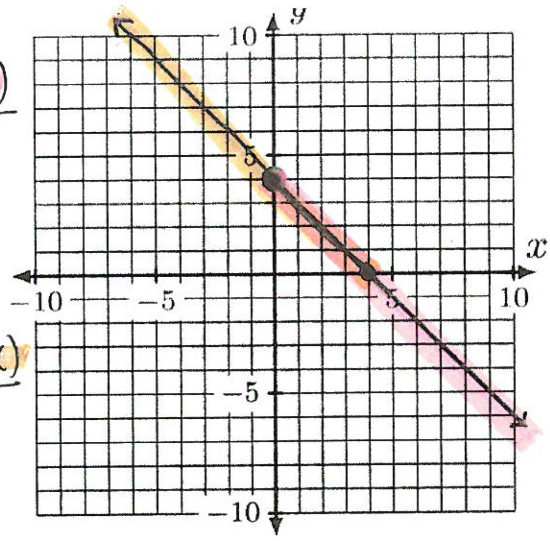


x	f(x)
-4	-4.5
-3.5	0
-3	3
-2.5	4.5
-2	5
-1.5	4.5
-1	3.5
0	0
1	-3.5
1.5	-4.5
2	-5
2.5	-4.5
3	-3
3.5	0
4	4.5

x	$f^{-1}(x)$
-4.5	-4
0	-3.5
3	-3
4.5	-2.5
5	-2
4.5	-1.5
3.5	-1
0	0
-3.5	1
-4.5	1.5
-5	2
-4.5	2.5
-3	3
0	3.5
4.5	4

11)

x	f(x)
0	4
4	0



x	$f^{-1}(x)$
4	0
0	4