

Lesson 1.8 – Inverse Functions

What is an inverse function?

x	$f(x)$	$g(x)$
-4	3	10
-3	-4	-1
-2	0	4
-1	1	3
0	10	2
1	5	1
2	2	0
3	8	-5
4	-2	-2

1. Find x such that $f(x) = 5$

2. Evaluate the following:

a. $f^{-1}(5) + g^{-1}(3)$

b. $f^{-1} \circ g^{-1}(-5)$

c. $f^{-1} \circ f^{-1}(8)$

d. $g^{-1} \circ g^{-1}(3) + g(3)$

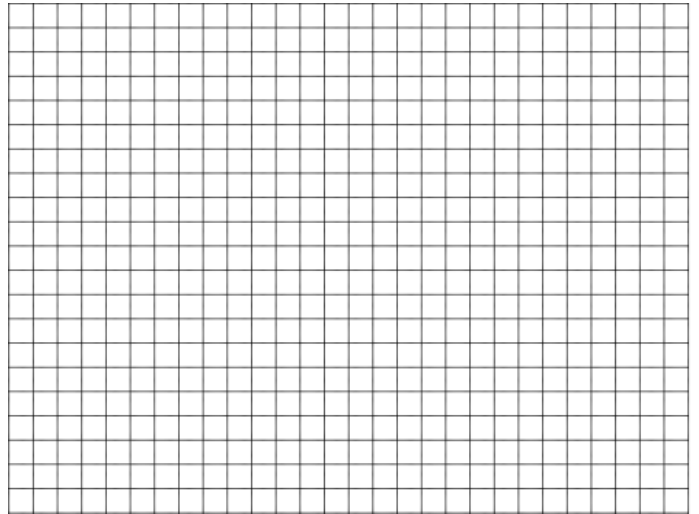
e. $f^{-1} \circ g^{-1}(4)$

f. $f \circ f^{-1}(3)$

g. $f^{-1} \circ f^{-1}(2)$

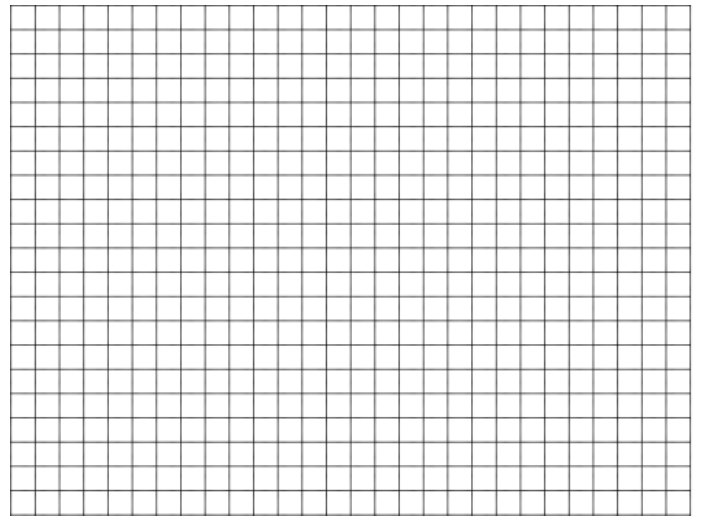
I. Inverse Functions Graphically

1. Use your calculator to sketch a graph of $f(x) = \frac{1}{4}x^3$.
2. On the same graph, use your calculator (or any other means) to help you sketch a graph of $g(x) = \sqrt[3]{4x}$.
3. Visually, what is the relationship between the two functions?

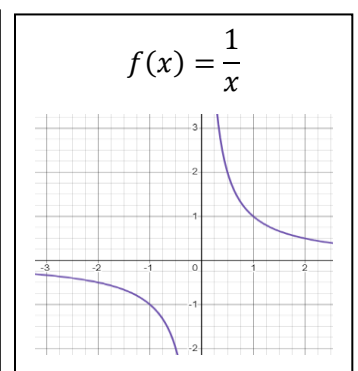
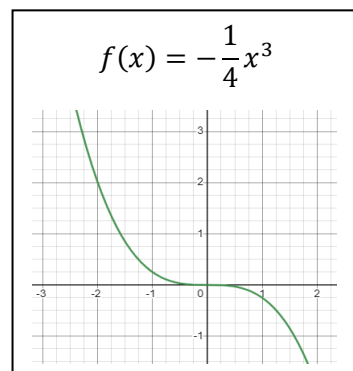
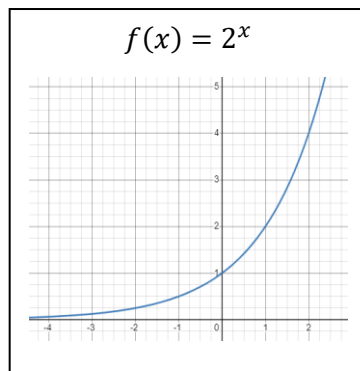
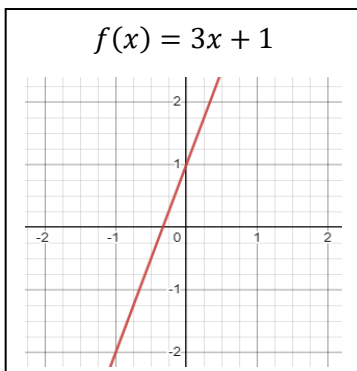


Finding inverse functions graphically:

4. Find the “inverse function” of $f(x) = x^2$.
5. Graph $f(x)$ and its “inverse” $f^{-1}(x)$ to the right. What is wrong with this function?
6. What is a **one-to-one function**?



7. Graph the inverse of each function listed below.



II. Inverse Function Algebraically

8. Find the inverse function of $f(x) = 3x + 1$.

Finding inverse functions algebraically:

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

Find $g^{-1}(x)$, then show that $g \circ g^{-1}(x) = x$

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

Find $h^{-1}(x)$, then show $h \circ h^{-1}(x) = x$

11. Let $m(x) = \frac{x-4}{2}$ and $f(x) = 3x + 1$. Evaluate the following.

a. $f^{-1} \circ m^{-1}(x)$

b. $(f \circ m)^{-1}(x)$

c. $m^{-1} \circ f^{-1}(x)$