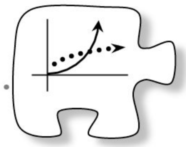
CW#____ Name:______________________________

5.1.2 How can I determine an inverse?

Using a Graph to Determine an Inverse

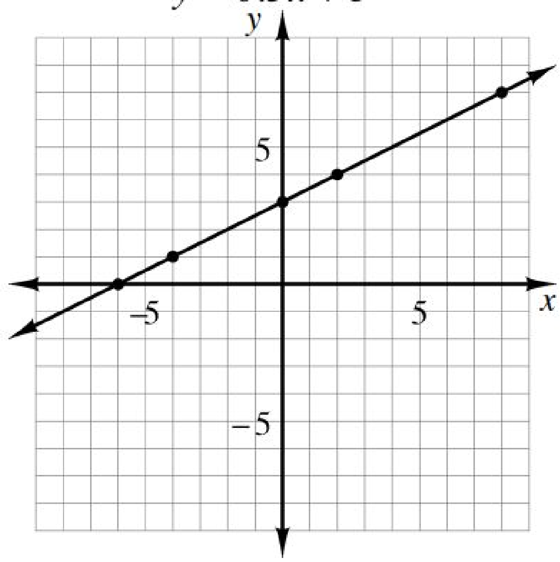


#15

a. Make a careful graph of each function's inverse on the same set of axes as its corresponding function. Look for a way to make the graph without determining the equation of the inverse first. Be prepared to share your strategy with the class.

Original Inverse

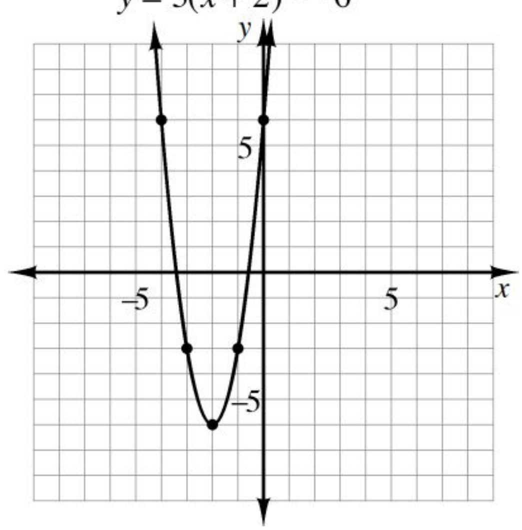
$y = 0.5x + 3$



Is the inverse a function?

Original Inverse

$y = 3(x+2)^2 - 6$

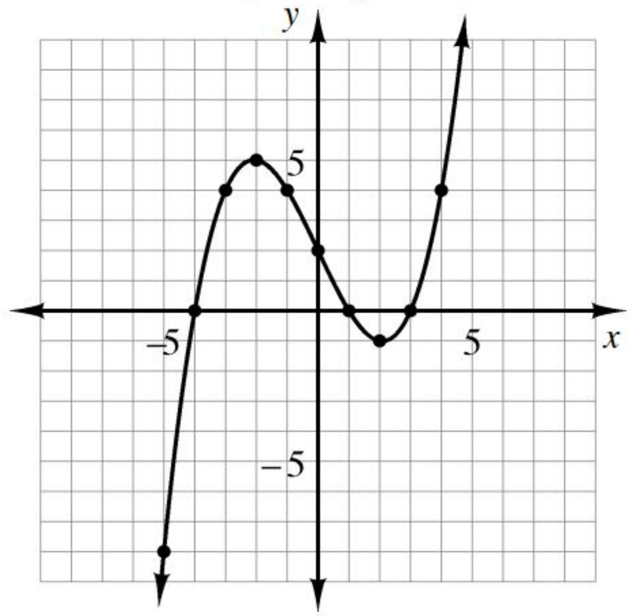


Is the inverse a function?

Original

Inverse

$$y = \frac{1}{6}x^3 - \frac{13}{6}x + 2$$



Is the inverse a function?

b. Describe the relationship between the coordinates of a function and the coordinates of its inverse. Use tables of the function and its inverse to show what you mean.

#16 When you look at the graph of a function and its inverse, you can see a symmetrical relationship between the two graphs demonstrated by a line of symmetry.

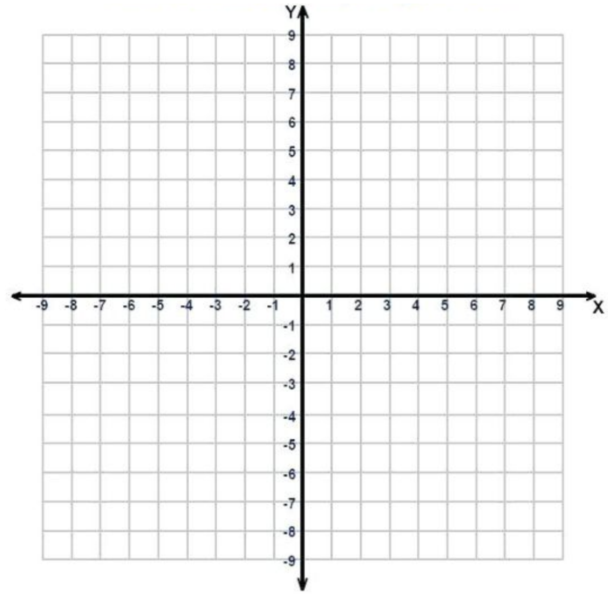
a. Draw the line of symmetry for each graph in problem 5-15.

b. What is the equation of the line of symmetry for each graph?

c. Why do you think this line makes sense as the line of symmetry between the graph of a function and its inverse?

#17

$$y = \left(\frac{x}{2}\right)^2$$



#18 Now you will look at the relationship between the domain and range of a function and its inverse.

a. What are the domain and range of $y = \left(\frac{x}{2}\right)^2$? What are the domain and range of its inverse?

b. How are the domain and range of the original function related to the domain and range of the inverse?

#20 Write the equation of the inverse of $y = \left(\frac{x}{2}\right)^2$. Is there another way to write it? If so, show how the two equations are equivalent. Demonstrate that your inverse equation undoes the original function and use a graphing calculator to check the graphs.

#21 Consider your equation for the inverse of $y = \left(\frac{x}{2}\right)^2$.

a. Is the inverse a function? How can you tell?

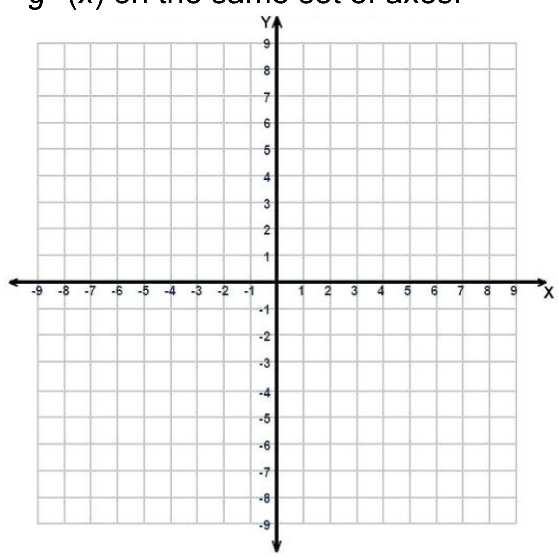
b. Use color to trace over the portion of your graph of $y = \left(\frac{x}{2}\right)^2$ for which $x \geq 0$. Then use another color to trace the corresponding part of the inverse graph. Write an equation for the traced portion of the inverse graph.

c. In part (b) you **restricted the domain** of the original function so that the inverse was also a function. Is there a different way to restrict the domain so that the inverse is a function? What is the equation of this inverse function?

#22 Consider the function $g(x) = (x - 3)^2$.

a. How can you restrict the domain of $g(x)$ so that its inverse will be a function?

b. Graph $y = g(x)$ with its domain restricted, and then graph $y = g^{-1}(x)$ on the same set of axes.



c. What is the equation for $g^{-1}(x)$?

#23 How can you determine from a graph whether its inverse will be a function? Explain. What are some examples of other functions whose inverses are not functions?