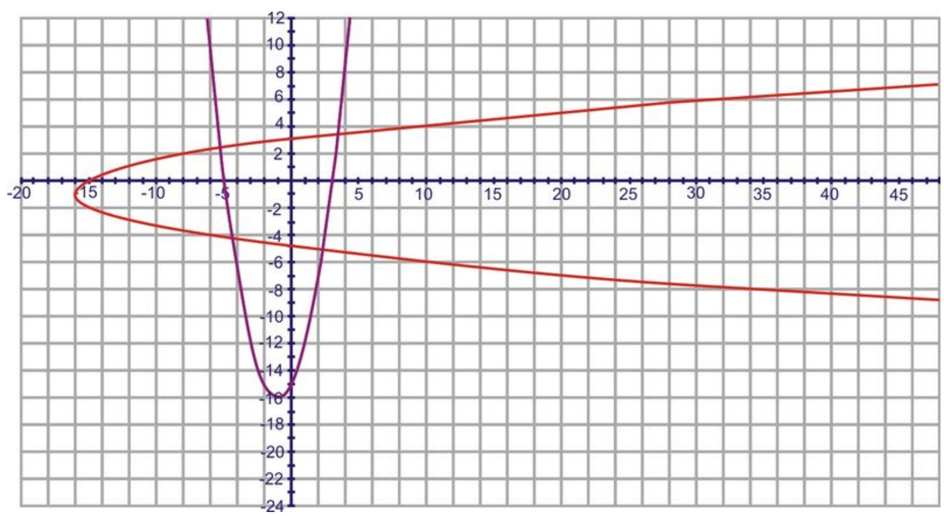
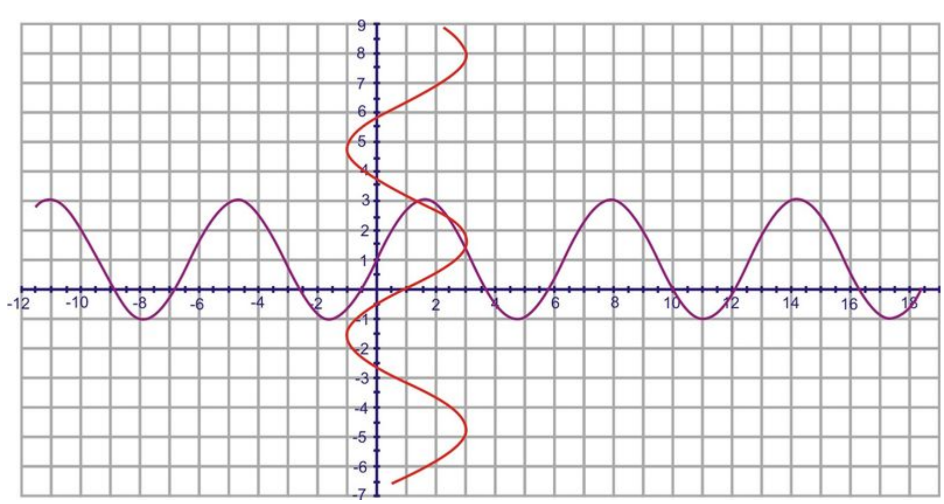
4.2 Graphing Inverse Trigonometric Functions

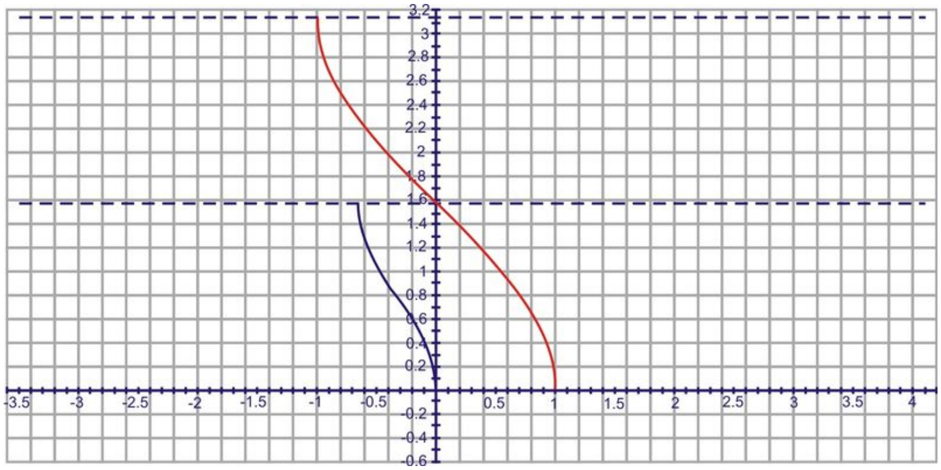
1. The graph represents a one-to-one function. It passes both a vertical and a horizontal line test. The inverse would be a function.
2. The graph represents a function, but is not one-to-one because it does not pass the horizontal line test. Therefore, it does not have an inverse that is a function.
3. The graph does not represent a one-to-one function. It fails a vertical line test. However, its inverse would be a function.
4. By selecting 4-5 points and switching the x and y values, you will get the red graph below.



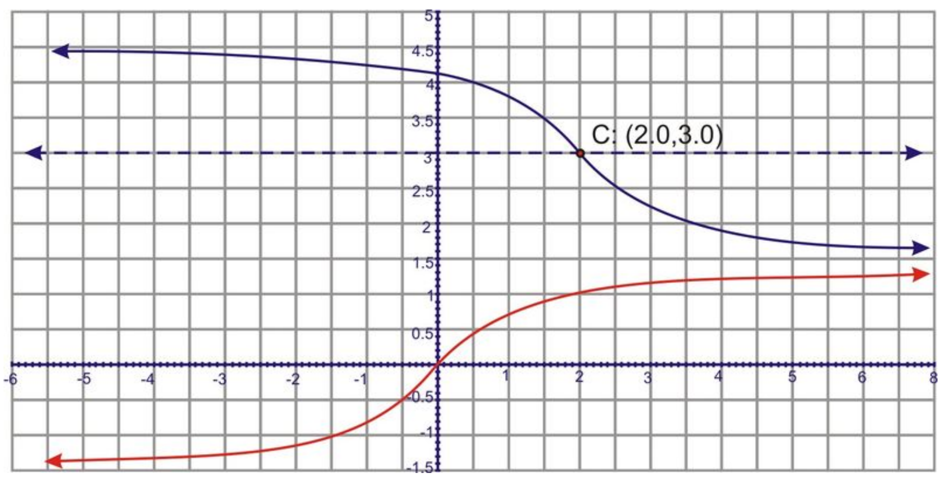
5. By selecting 4-5 points and switching the x and y values, you will get the red graph below.

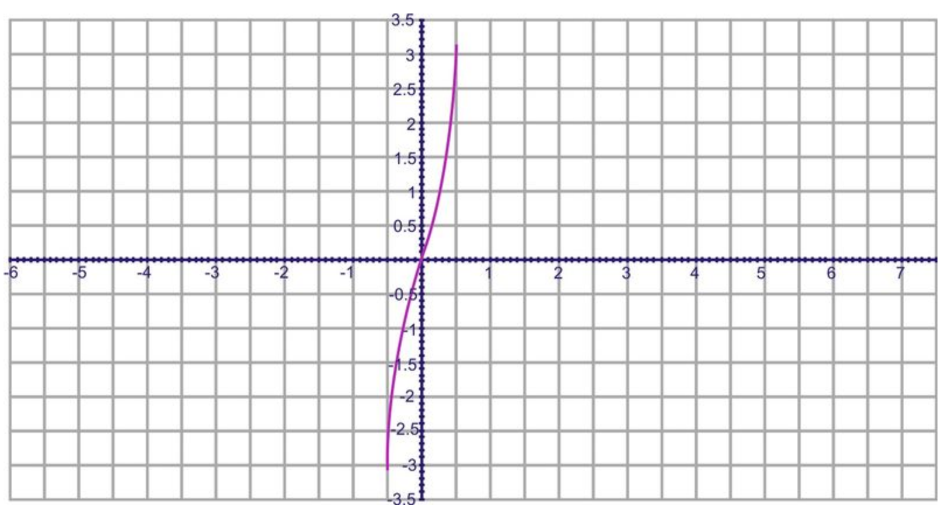


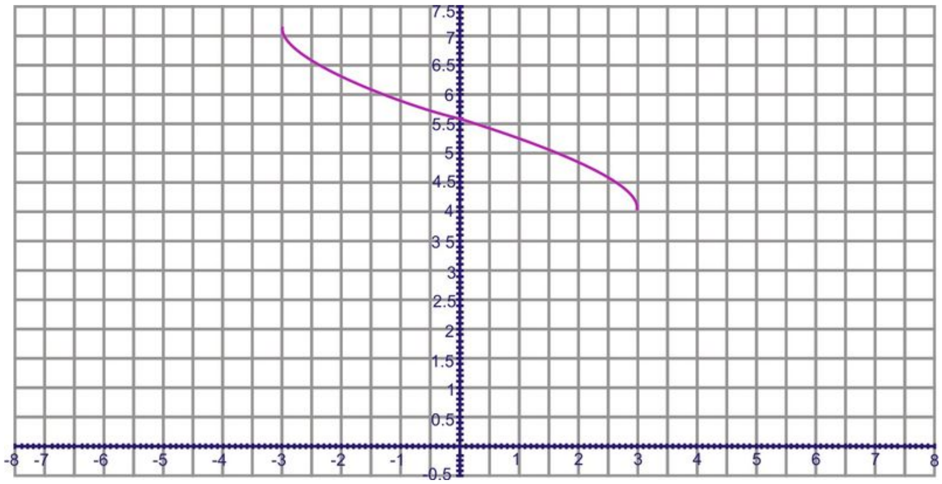
6. $y = \frac{1}{2}\cos^{-1}(3x+1)$ is in blue and $y = \cos^{-1}(x)$ is in red. Notice that $y = \frac{1}{2}\cos^{-1}(3x+1)$ has half the amplitude and is shifted over -1. The 3 seems to narrow the graph.



7. $y = 3 - \tan^{-1}(x-2)$ is in blue and $y = \tan^{-1} x$ is in red. $y = 3 - \tan^{-1}(x-2)$ is shifted up 3 and to the right 2 (as indicated by point C, the "center") and is flipped because of the $-\tan^{-1}$.



8. 

9. 

10.

$$\begin{aligned} y &= \cos\left(x - \frac{\pi}{2}\right) \\ x &= \cos\left(y - \frac{\pi}{2}\right) \\ \cos^{-1} x &= y - \frac{\pi}{2} \\ \frac{\pi}{2} + \cos^{-1} x &= y \end{aligned}$$

$\sin^{-1} x \neq \frac{\pi}{2} + \cos^{-1} x$, graphing the two equations will illustrate that the two are not the same. This is because of the restricted domain on the inverses. Since the functions are periodic, there is a phase shift of cosine that, when the inverse is found, is equal to sine inverse.