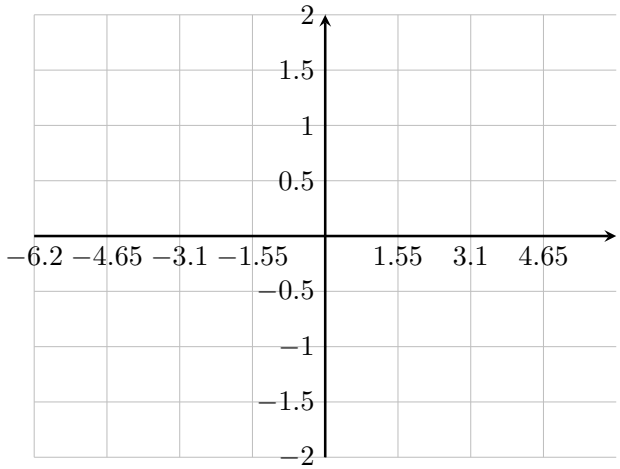
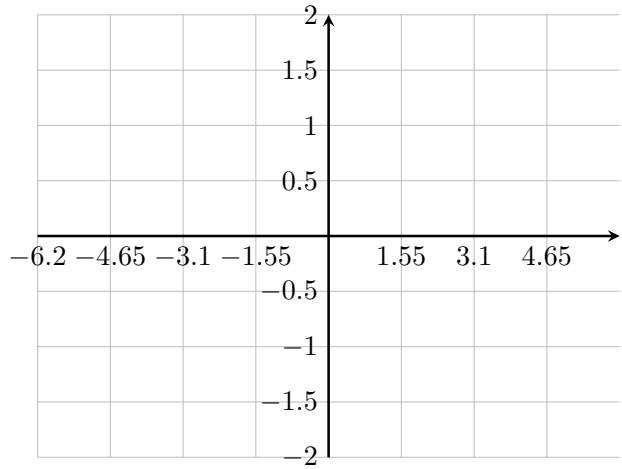
We will be exploring the relationship between the cosine function and the secant function. Let $f(x) = \cos x$ and $g(x) = \sec x = \frac{1}{\cos x}$.

1. Draw the graphs of $f(x)$ and $g(x)$ in the axes below. Write down the definition of $g(x)$ as a piecewise function.

Graph of f

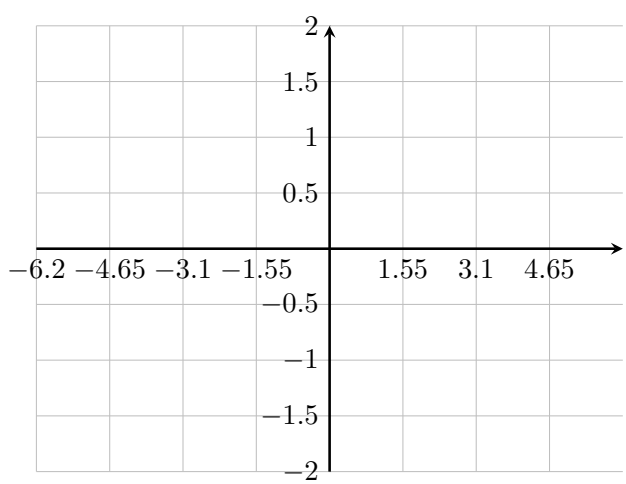


Graph of g



2. Is $g(x) = f^{-1}(x)$? If not, draw the graph of an inverse function for $f(x) = \cos x$ and give a definition for the function.

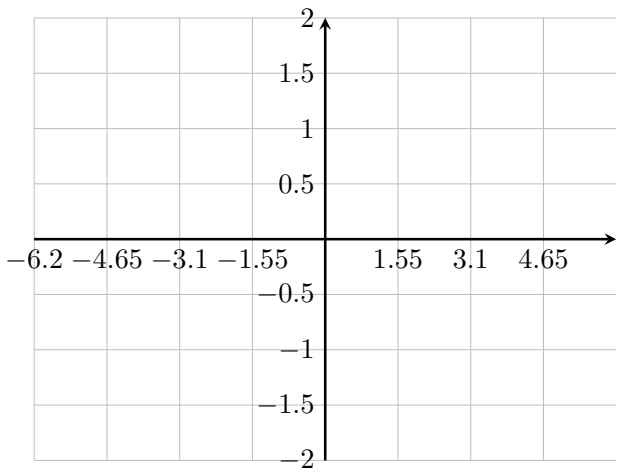
Graph of f^{-1}



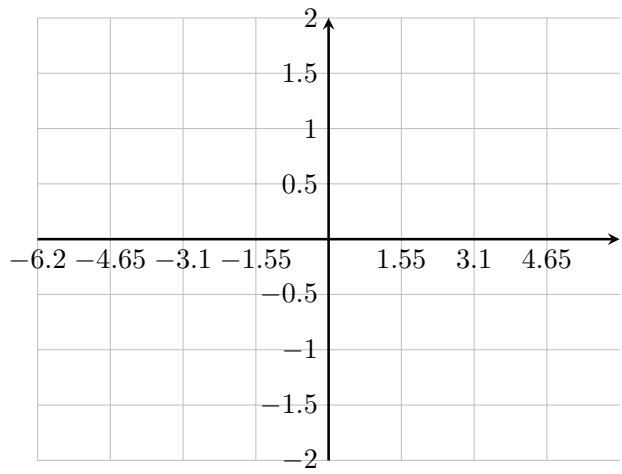
3. The canonical inverse function for $\cos x$ is also known as the arccosine and outputs values between 0 and π. Draw the graph of $h(x) = \arccos x$. How does it compare to the graphs of the inverses drawn in the previous part?

4. Draw the graphs of $f(h(x))$ and $h(f(x))$. Are these graphs the same, why or why not?

Graph of $f \circ h$



Graph of $h \circ f$



5. How would your results extend to the other trigonometric functions $\sin x$ and $\tan x$?