Trigonometry Lesson 4: Graphs of Sine, Cosine, and Tangent
textbook section 7.5

1. A *repetitive length* of a function is a value t for which $f(x+t)=f(x)$. What are some repetitive lengths of the sine, cosine, and tangent functions? Explain.

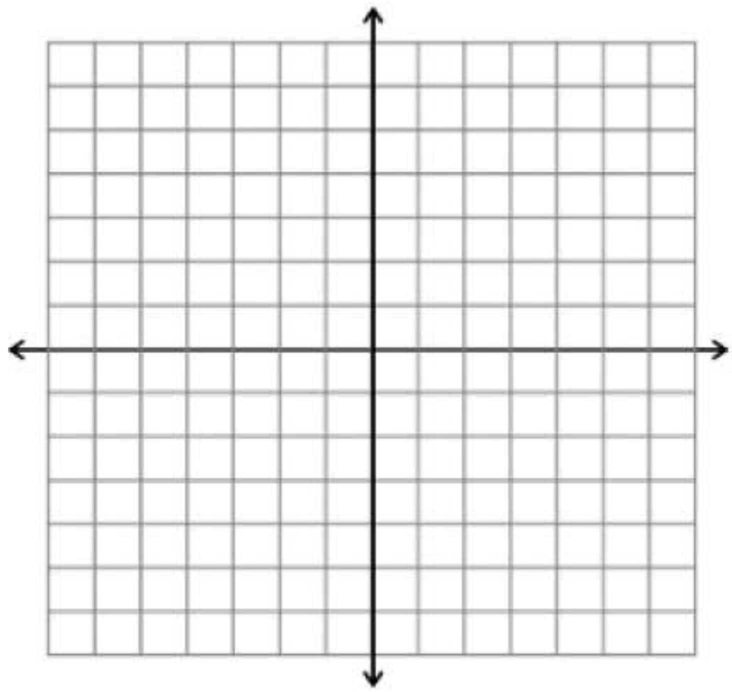
2. The *period* of a function is the shortest repetitive length. Find the periods of sine and cosine.

3. What is the period of tangent? Use what you know about sine and cosine to *prove* that this is the case.

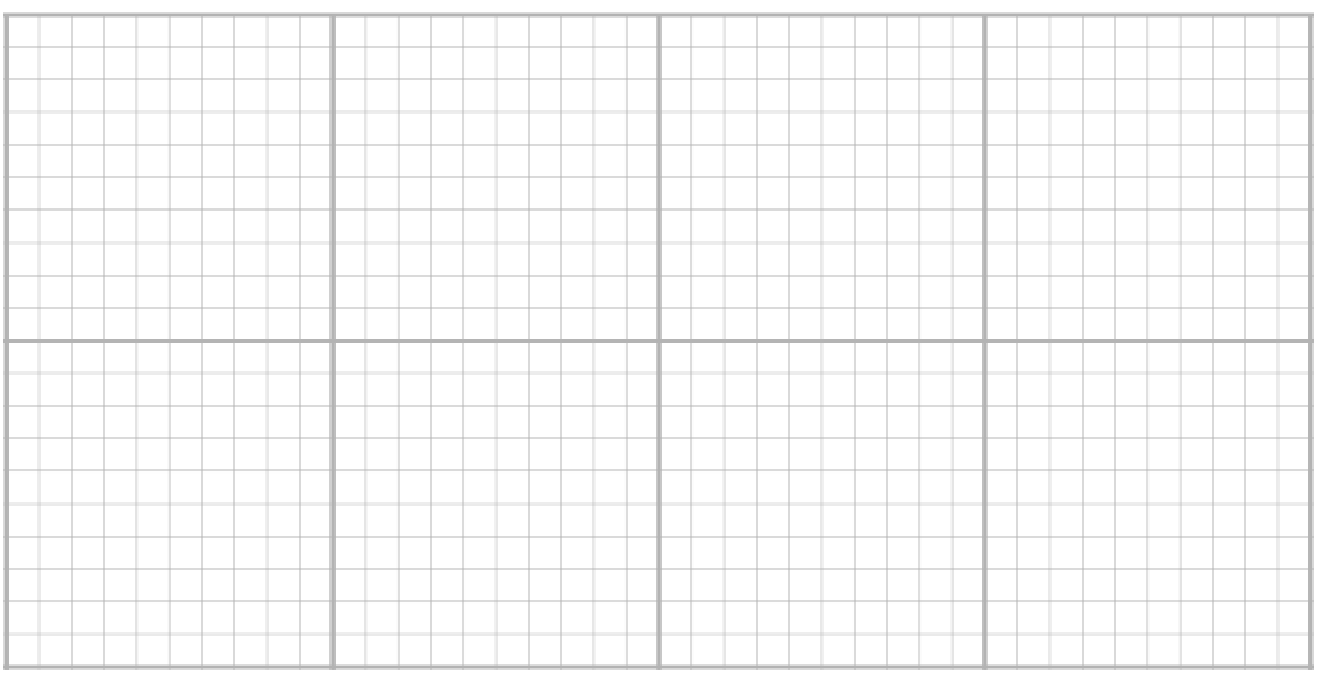
4. Using the results of parts (2) and (3), find the periods of the reciprocal functions: cosecant, secant, cotangent. Prove your assertions.

5. Use the given table to graph the function $y = \sin x$ on the coordinate plane. Use increments of .2 on the y-axis and $\frac{\pi}{6}$ on the x-axis. (Use the decimal approximation $\frac{\sqrt{3}}{2} \approx .87$.) How can you make use of the fact that sine is an odd function?

x	$y = \sin x$
$-\pi$	
$-5\pi/6$	
$-2\pi/3$	
$-\pi/2$	
$-\pi/3$	
$-\pi/6$	
0	
$\pi/6$	
$\pi/3$	
$\pi/2$	
$2\pi/3$	
$5\pi/6$	
π	

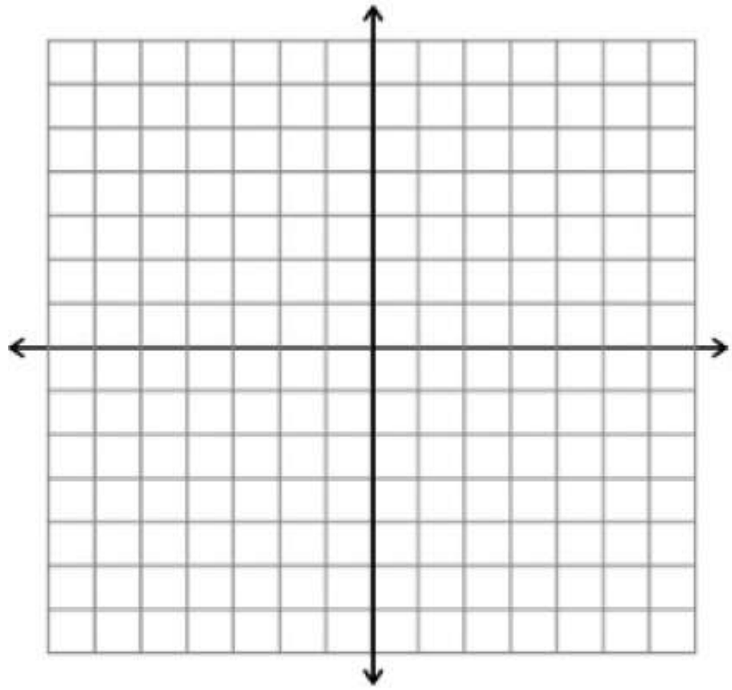


Why is it sufficient to graph only from $-\pi$ to π? In other words, how do we know that this gives us all the information that we need? Answer these questions and use your responses to graph sine on a much larger interval. Use the same scale as above and make the center of the rectangle the origin. You do not have to label each x value, but provide enough labels so that the scales on the axes are obvious.

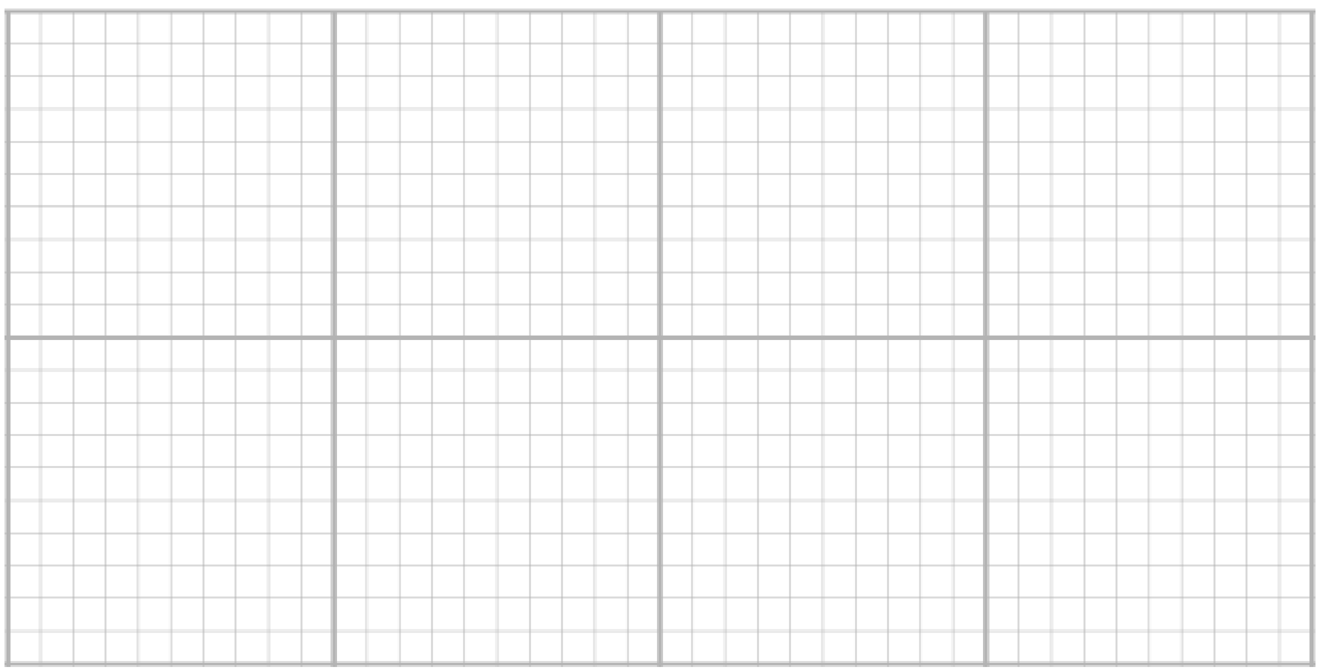


6. Use the given table to graph the function $y = \cos x$ on the coordinate plane. Use increments of .2 on the y-axis and $\frac{\pi}{6}$ on the x-axis. (Use the decimal approximation $\frac{\sqrt{3}}{2} \approx .87$.) How can you make use of the fact that cosine is an even function?

x	$y = \cos x$
$-\pi$	
$-5\pi/6$	
$-2\pi/3$	
$-\pi/2$	
$-\pi/3$	
$-\pi/6$	
0	
$\pi/6$	
$\pi/3$	
$\pi/2$	
$2\pi/3$	
$5\pi/6$	
π	

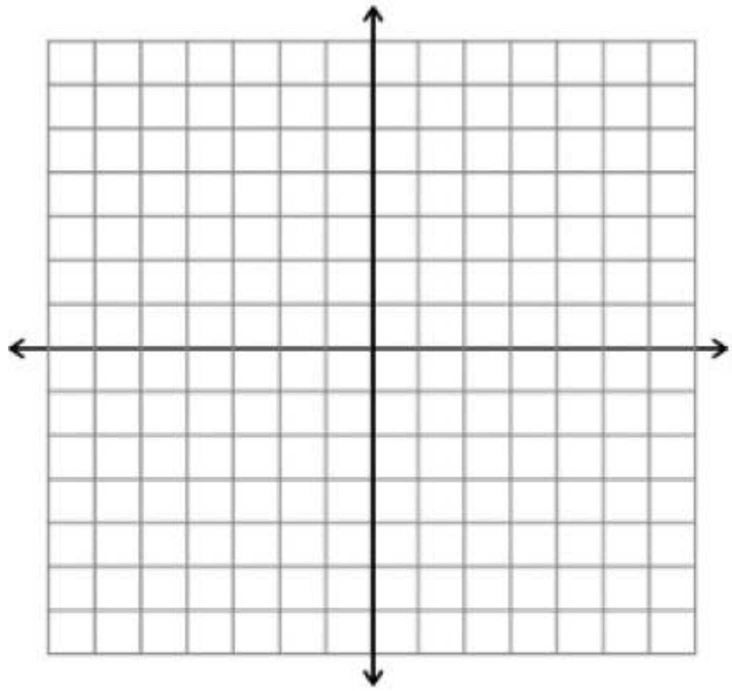


Why is it sufficient to graph only from $-\pi$ to π? In other words, how do we know that this gives us all the information that we need? Answer these questions and use your responses to graph cosine on a much larger interval. Use the same scale as above and make the center of the rectangle the origin. You do not have to label each x value, but provide enough labels so that the scales on the axes are obvious.

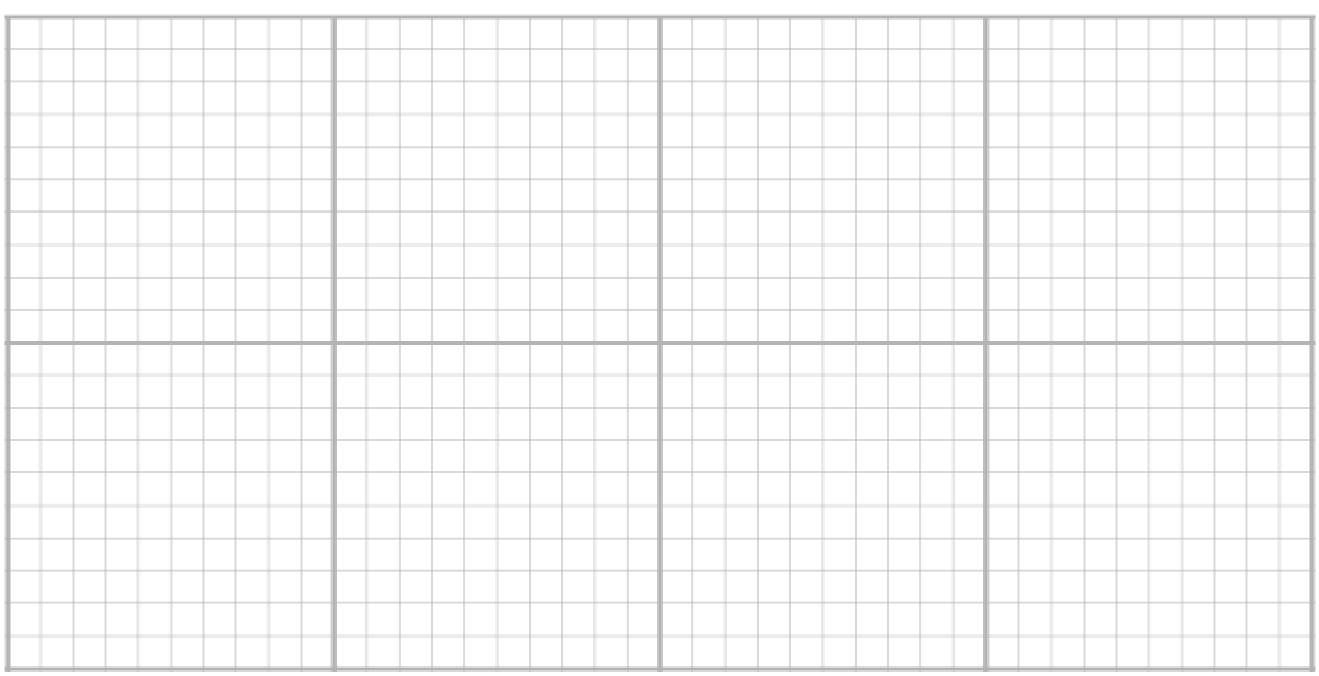


7. Use the given table to graph the function $y = \tan x$ on the coordinate plane. ***Use increments of .4*** (a different scale from sine and cosine, you will see why) on the y-axis and $\frac{\pi}{6}$ on the x-axis. (Use the decimal approximations $\sqrt{3} \approx 1.73$ and $\frac{\sqrt{3}}{3} \approx .58$.) Remember to use the fact that tangent is odd.

x	$y = \tan x$
$-\pi/2$	
$-\pi/3$	
$-\pi/6$	
0	
$\pi/6$	
$\pi/3$	
$\pi/2$	



Why is it sufficient to graph only from $-\frac{\pi}{2}$ to $\frac{\pi}{2}$? In other words, how do we know that this gives us all the information that we need? Answer these questions and use your responses to graph tangent on a much larger interval. Use the same scale as above and make the center of the rectangle the origin. You do not have to label each x value, but provide enough labels so that the scales on the axes are obvious.



8. Recall the following terms:

Domain of a function:

Range of a function:

9. Use the graphs of the sine, cosine, and tangent functions to find the domain and range for each:

	Domain	**Range**
sin *x*		
cos *x*		
tan *x*		