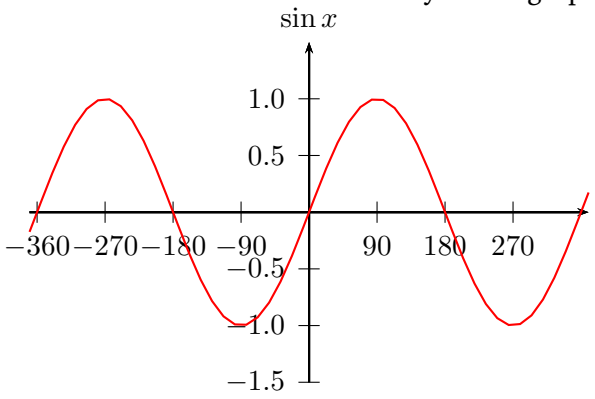
MATH 7: HANDOUT 24
TRIGONOMETRY 4: TRIGONOMETRIC GRAPHS.

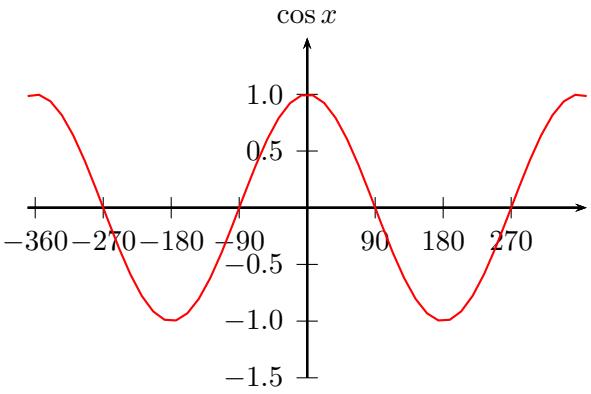
GRAPH OF SINE AND COSINE

By looking at the values of sine as we go around the trigonometric circle, we recall a few facts about the sine function :

- $\sin 0 = \sin \pi = 0$
- $\sin x$ increases from 0 to $\frac{\pi}{2}$.
- At $x = \frac{\pi}{2}$, $\sin x$ reaches it's maximum value, 1.
- At $x = \frac{3\pi}{2}$, $\sin x$ reaches it's minimum value, -1.
- $\sin(x + 2\pi) = \sin x$.
- $\sin(x + \pi) = -\sin x$.

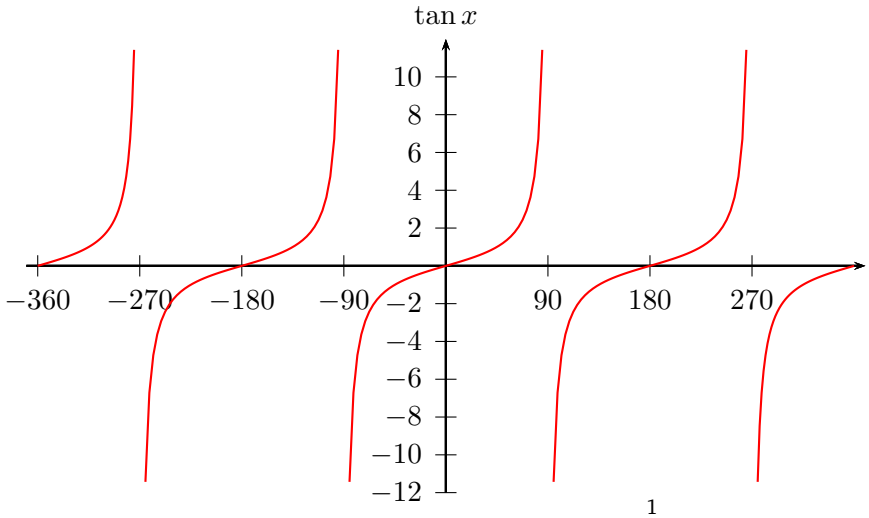
We can see all of these facts clearly in the graph of the function $\sin x$ on the left:





The graph of the function $\cos x$ is on the right and is very similar but "ahead" of $\sin x$ by 90^o or $\frac{\pi}{2}$

GRAPH OF TANGENT



The graph of tangent ($y = \tan x$) is not continuous: it goes to $+\infty$ for $x \to 90^o$ and $-\infty$ for $x \to -90^o$. It is periodic with half of the period of $\sin x$ and $\cos x$, because sine and cosine change sign when $x \to x + \pi$

HOMEWORK

1. Fill out the following table. Make sure you understand how to convert degrees to radians, and use the values of sine and cosine that you already know!

Degrees	Radians	sine	cosine	tangent
$180°$	π	0	-1	
$45°$				
$60°$				
$120°$				
$150°$				
$210°$				
$315°$				
	$2\pi/3$			
	$9\pi/4$			
	$5\pi/6$			
	$-5\pi/4$			
	$11\pi/3$			
	$7\pi/6$			
		$\sqrt{3}/2$	$1/2$	$\sqrt{3}$
		$\sqrt{2}/2$	$-\sqrt{2}/2$	1
		$-1/2$	$-\sqrt{3}/2$	$\frac{1}{\sqrt{3}}$

2. Using the trigonometric circle, show that $\cos x = \sin(x + \pi/2)$ for any angle x. Then use this fact and the graph of the sine function to construct (draw) the graph of the cosine function.