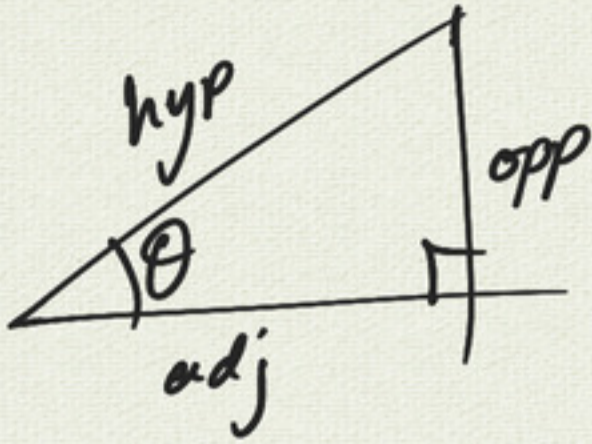


Trigonometry

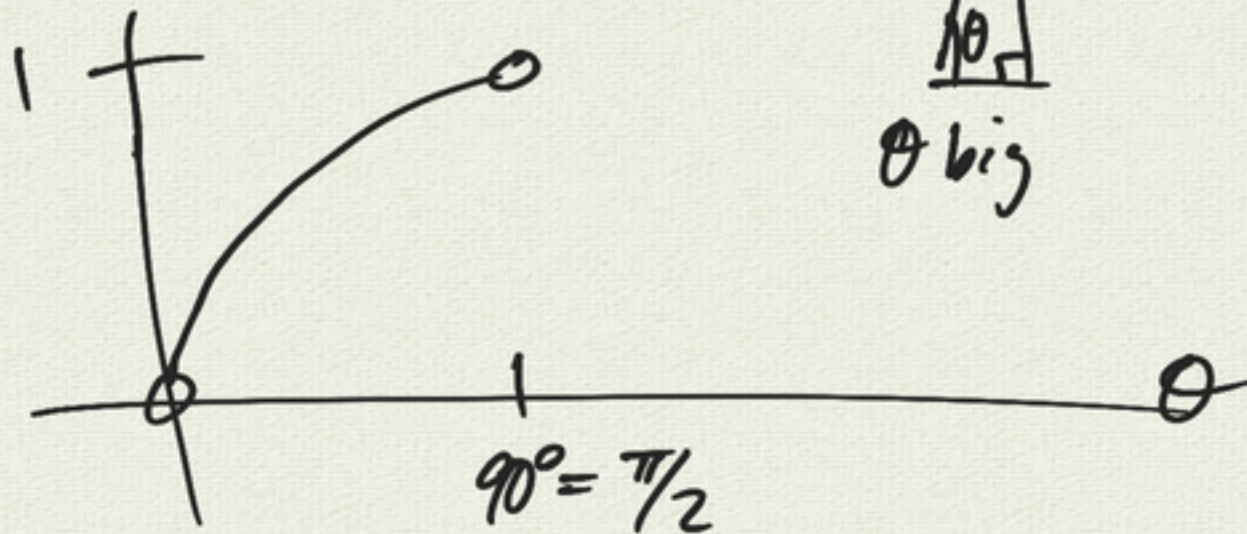
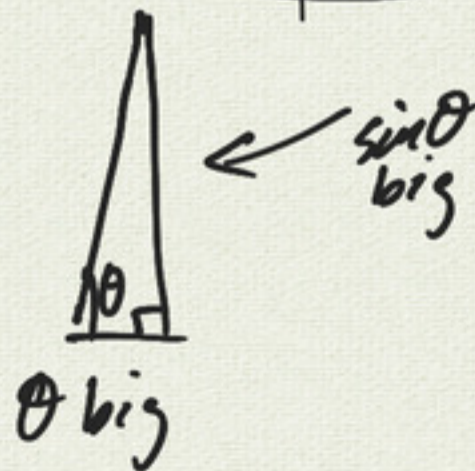
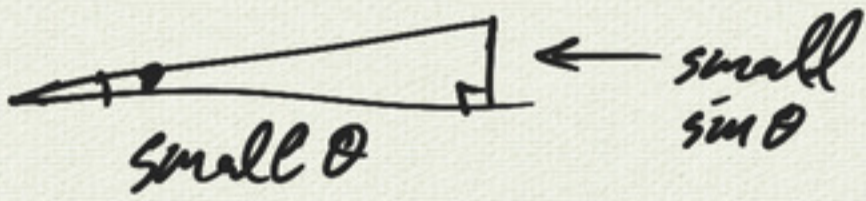
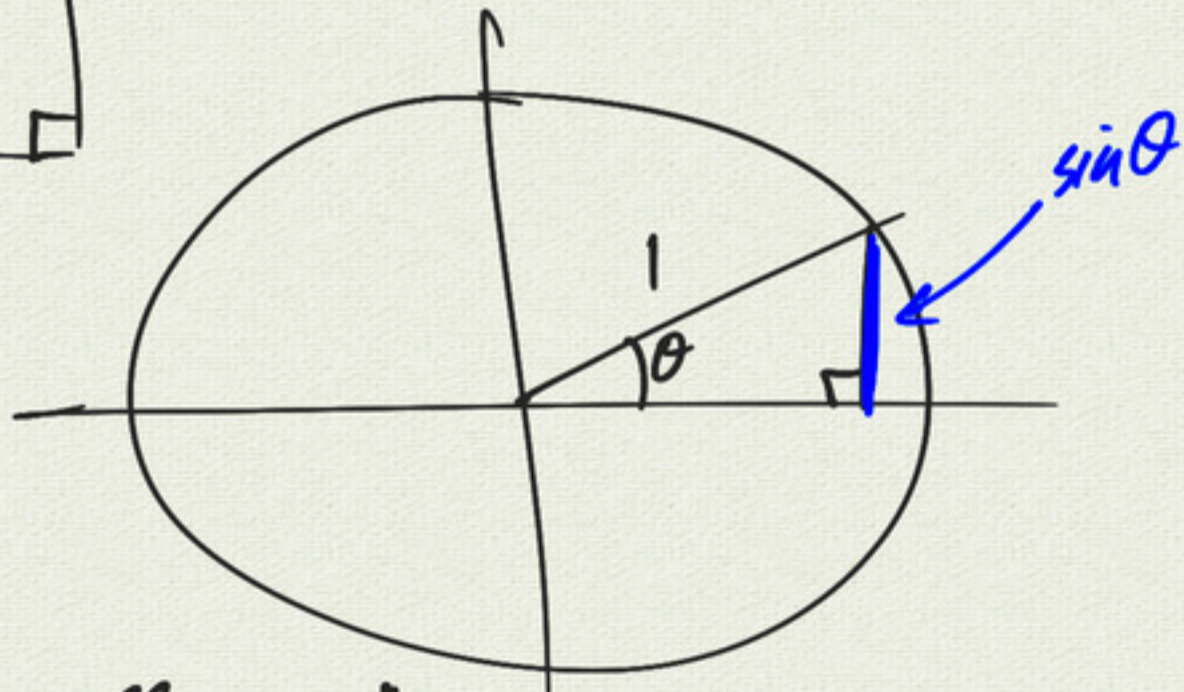
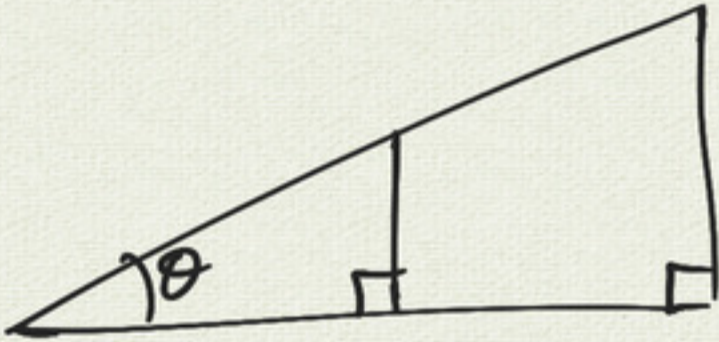


$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

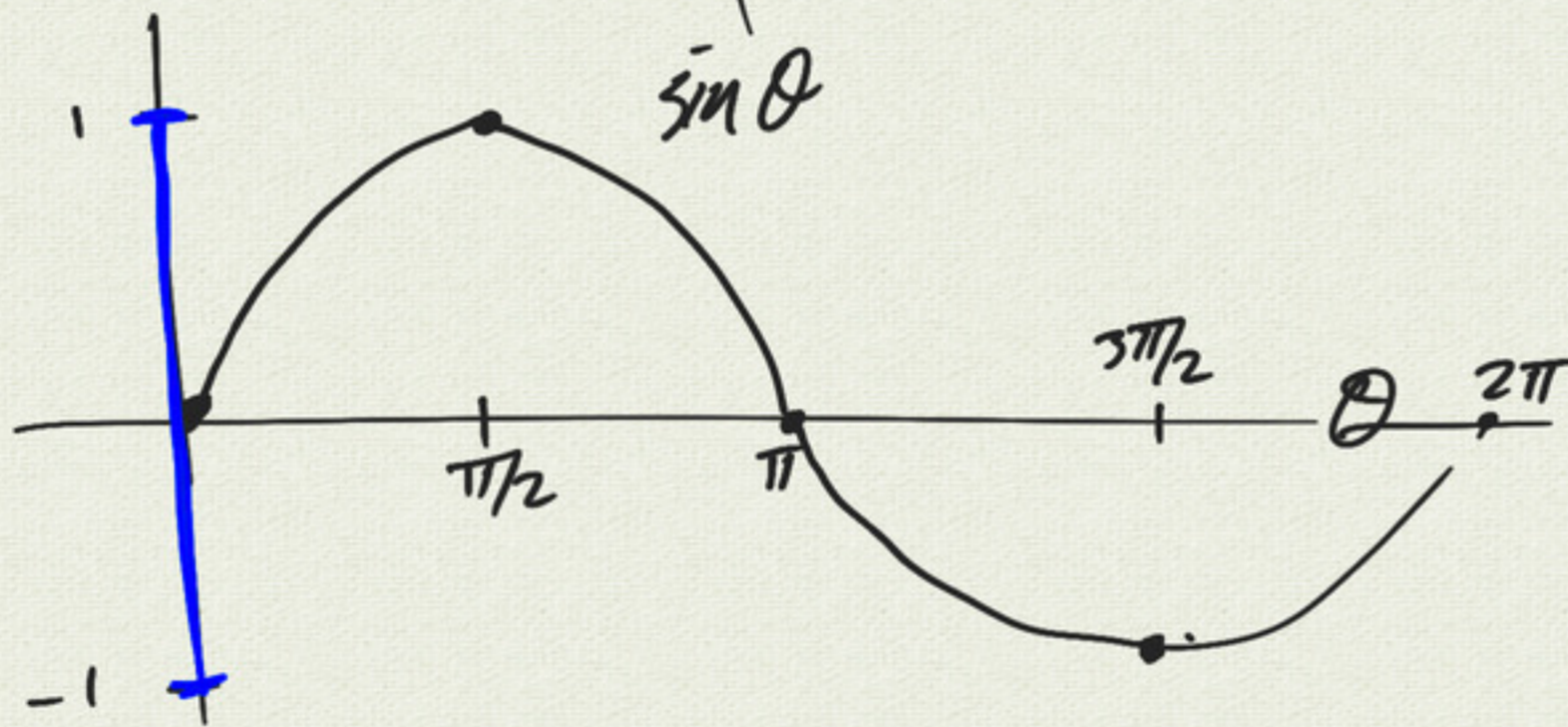
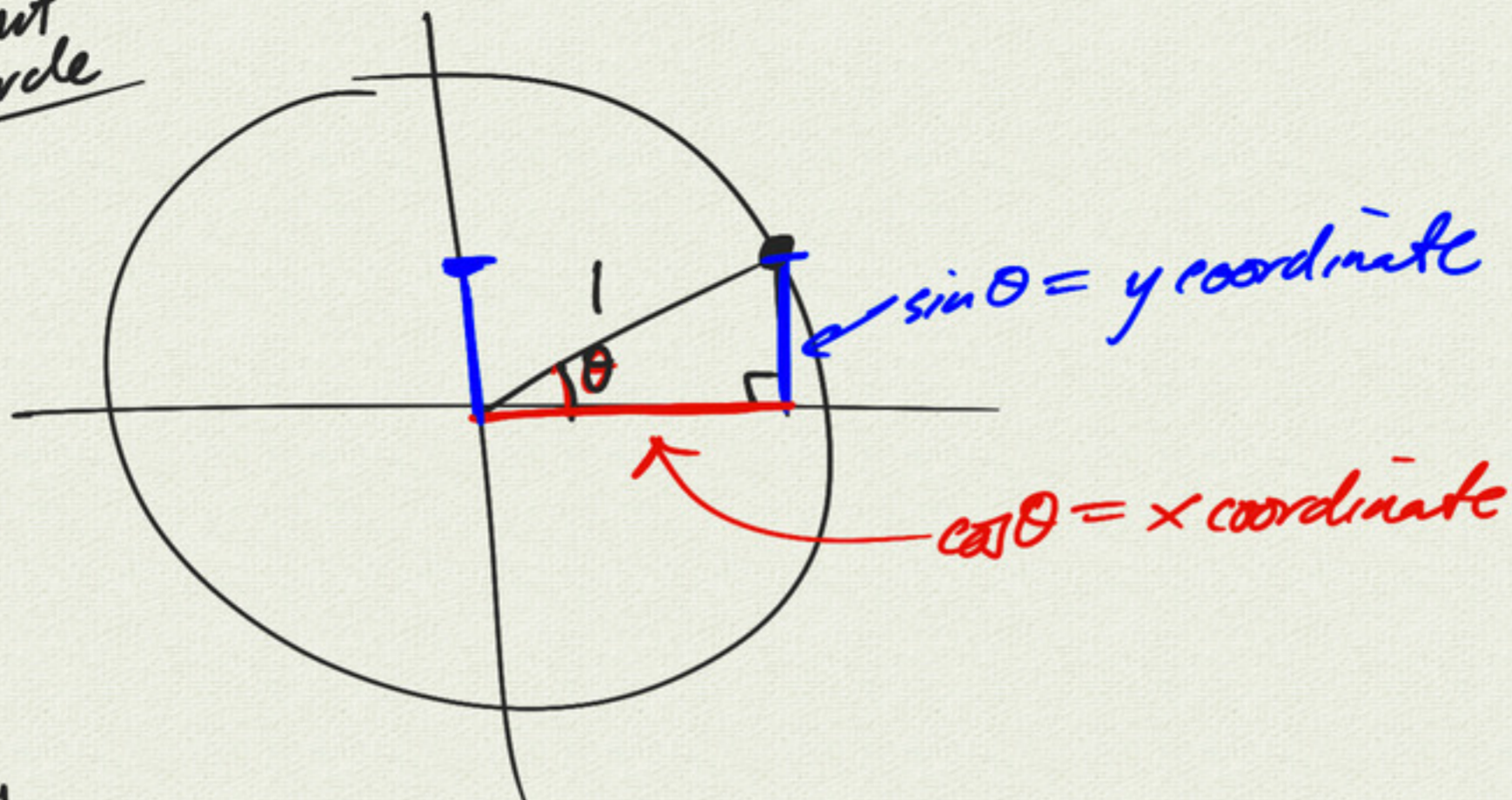
we like the unit circle

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$



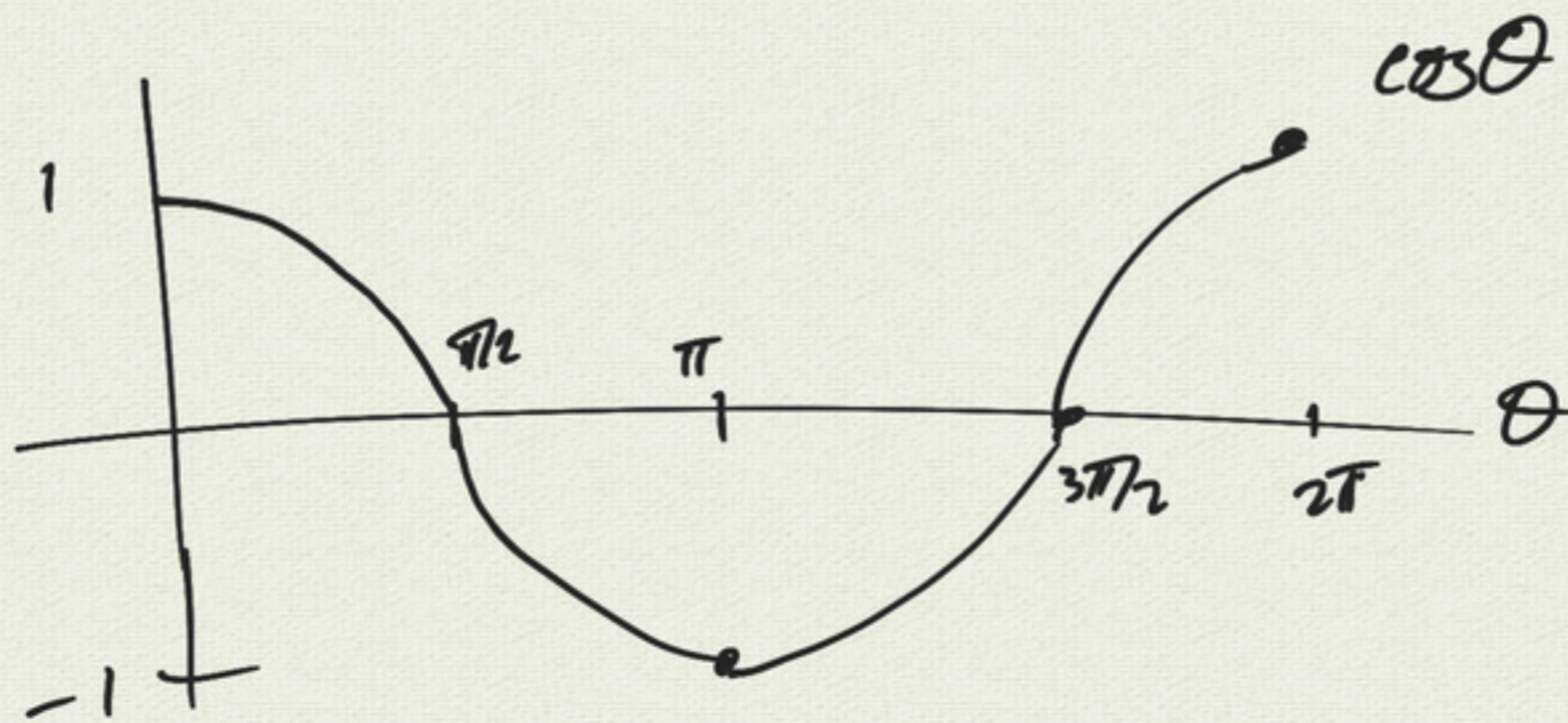
unit circle



period
 2π

domain
 \mathbb{R}
 $(-\infty, \infty)$

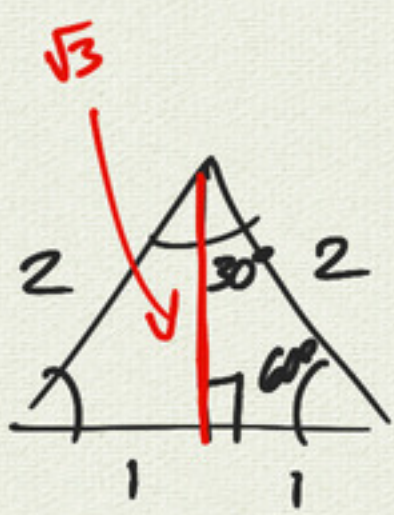
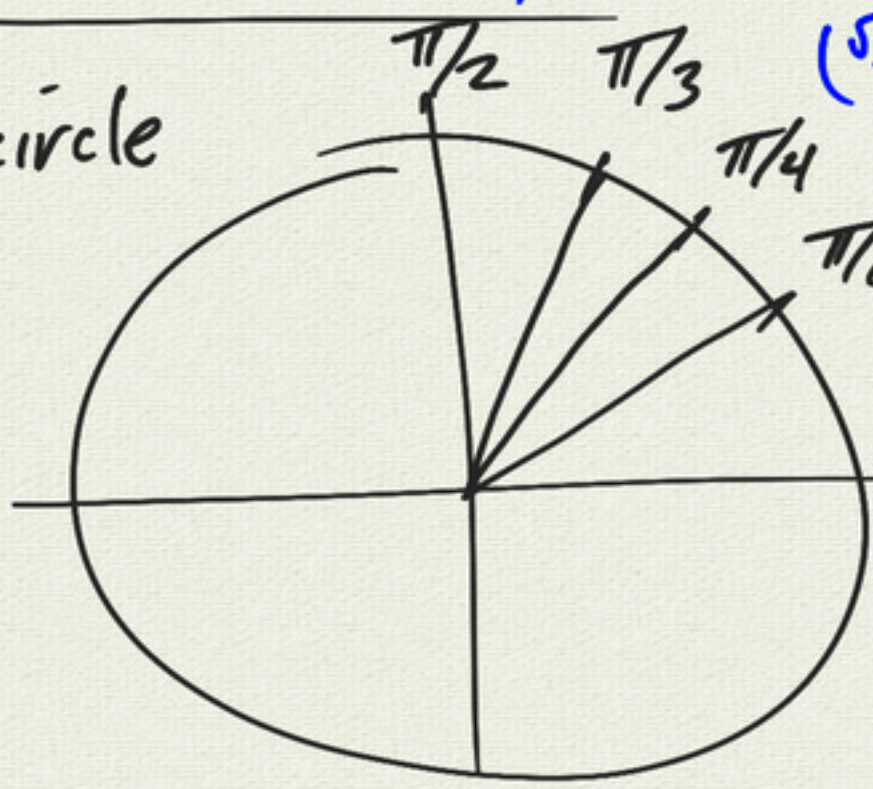
range
 $[-1, 1]$



define $\tan \theta = \frac{\sin \theta}{\cos \theta}$

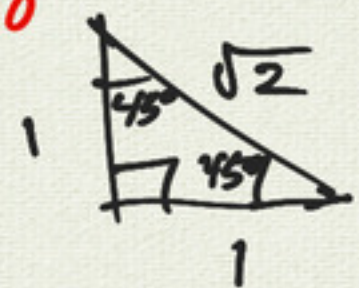
unit circle

undef
 $(0, 1)$
 $(\frac{1}{2}, \frac{\sqrt{3}}{2})$ $\sqrt{3}$
 $(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2})$ 1
 $(\frac{\sqrt{3}}{2}, \frac{1}{2})$ $\frac{1}{\sqrt{3}}$

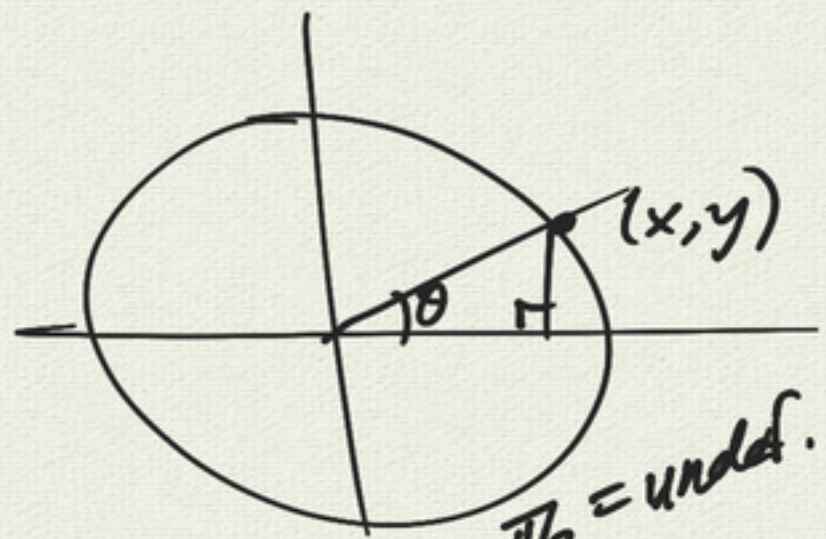


$\sin 30^\circ = \frac{1}{2}$
 $\cos 30^\circ = \frac{\sqrt{3}}{2}$

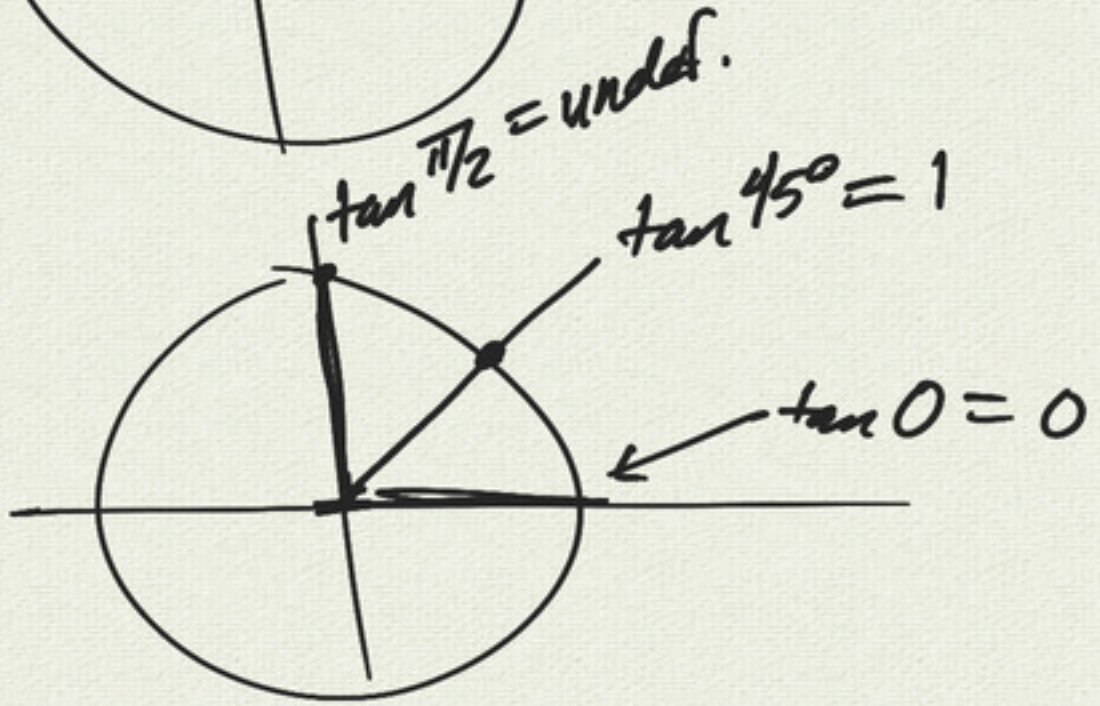
$(1, 0)$
 $\tan \theta = \frac{0}{1} = 0$



$\sin 45^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$
 $\cos 45^\circ = \frac{\sqrt{2}}{2}$



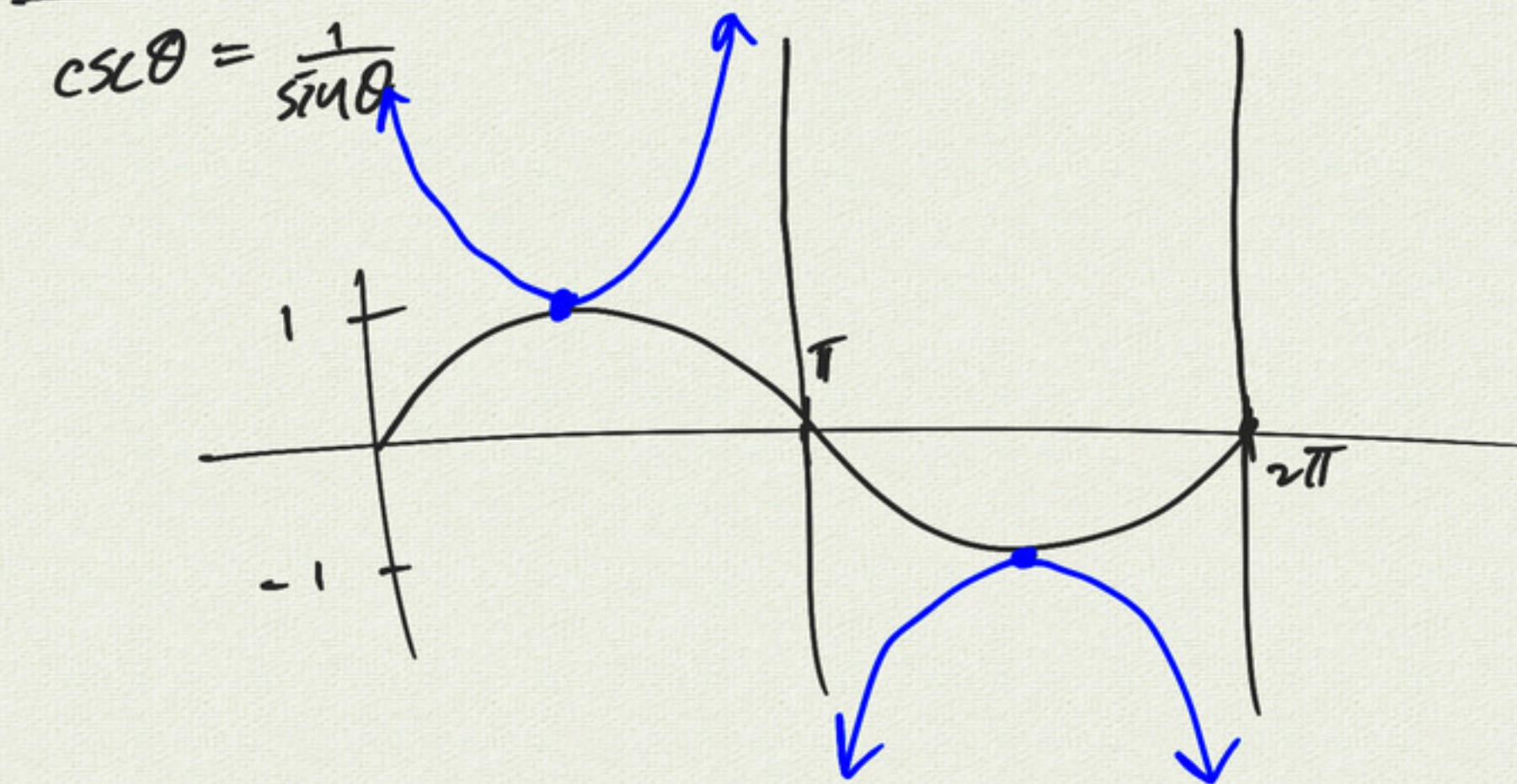
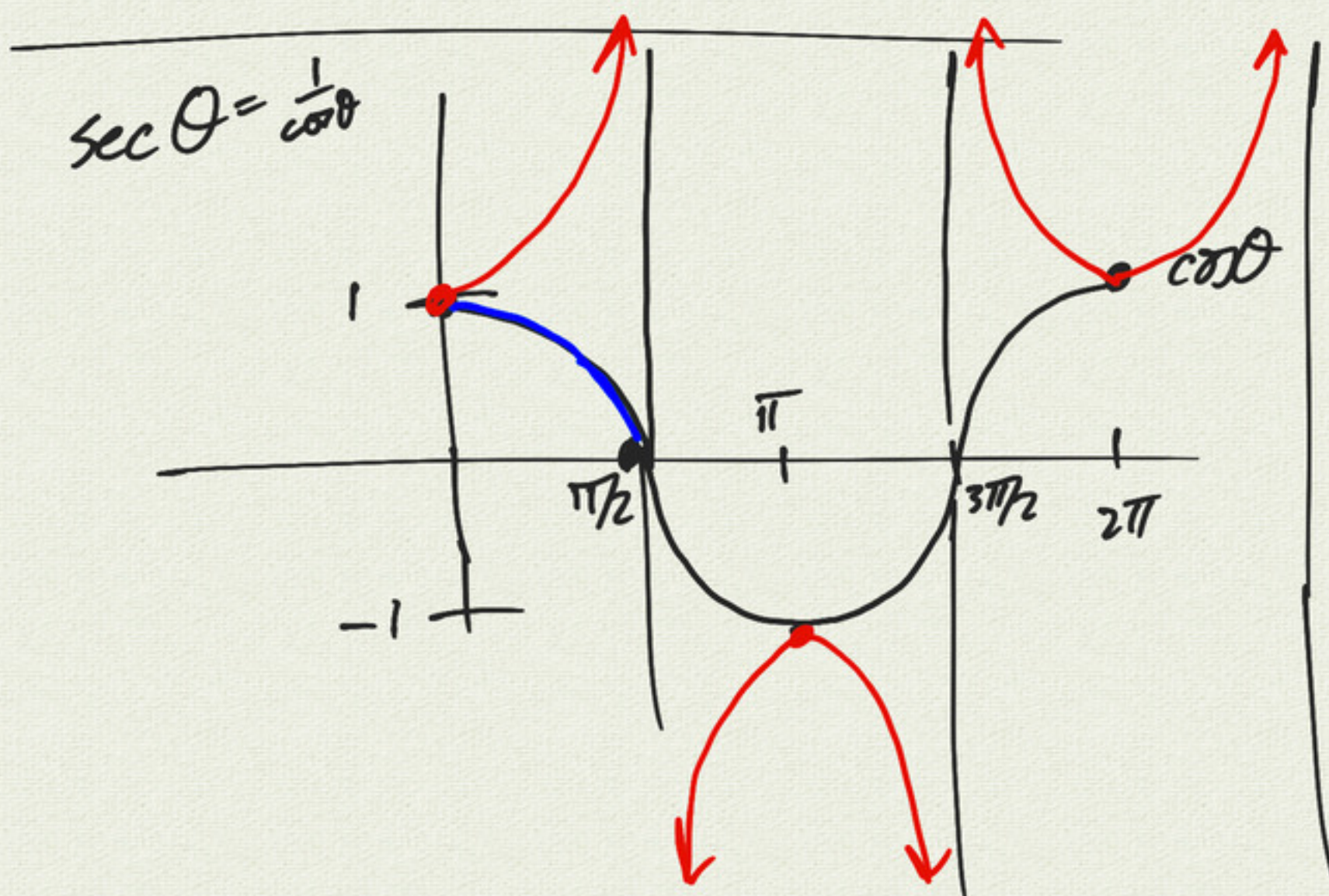
$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{y}{x} = \text{slope of line}$



$$\sec \theta = \frac{1}{\cos \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

$$\cot \theta = \frac{1}{\tan \theta} = \frac{\cos \theta}{\sin \theta}$$

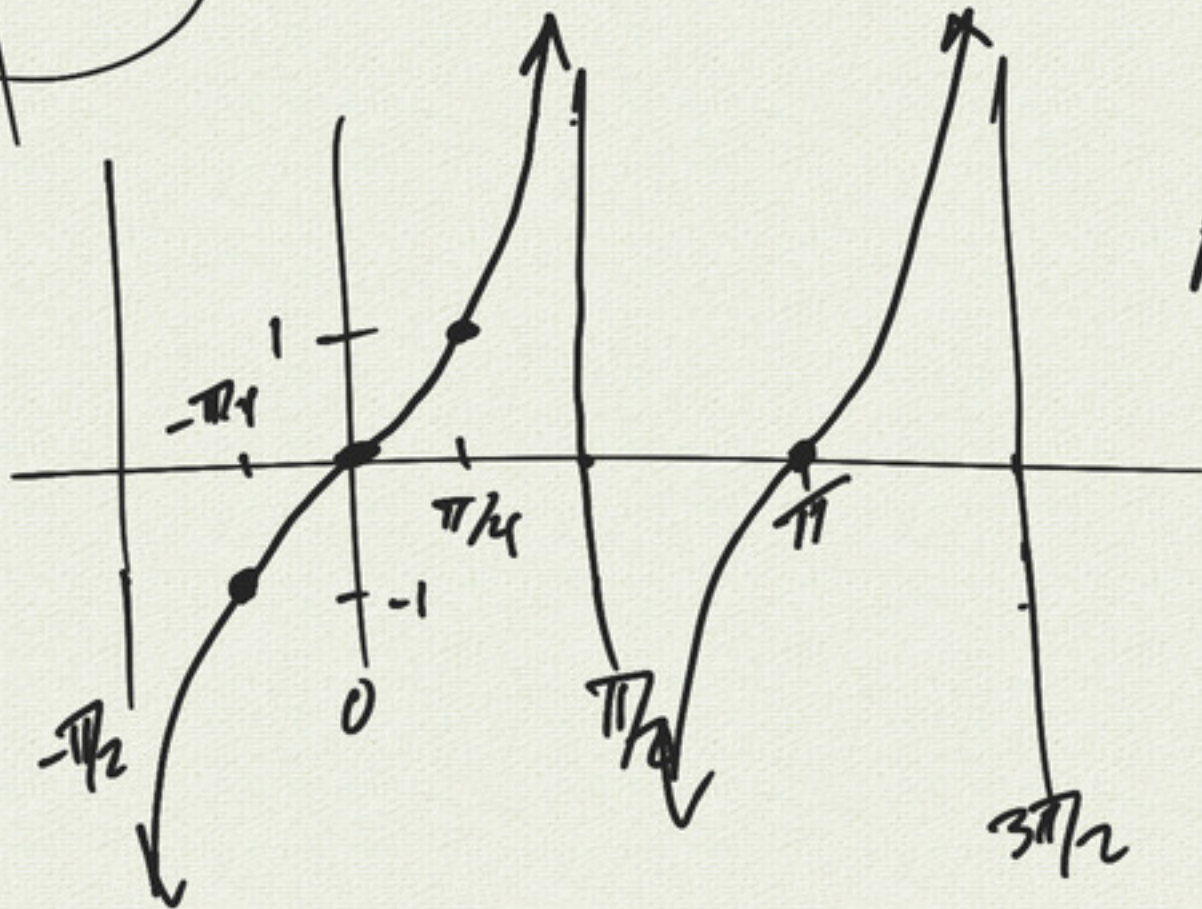
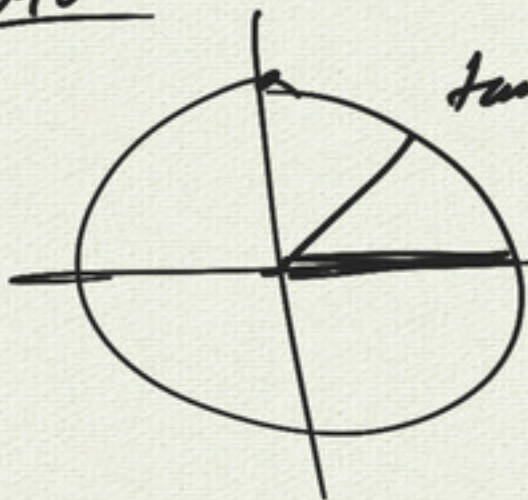


$\tan \theta$

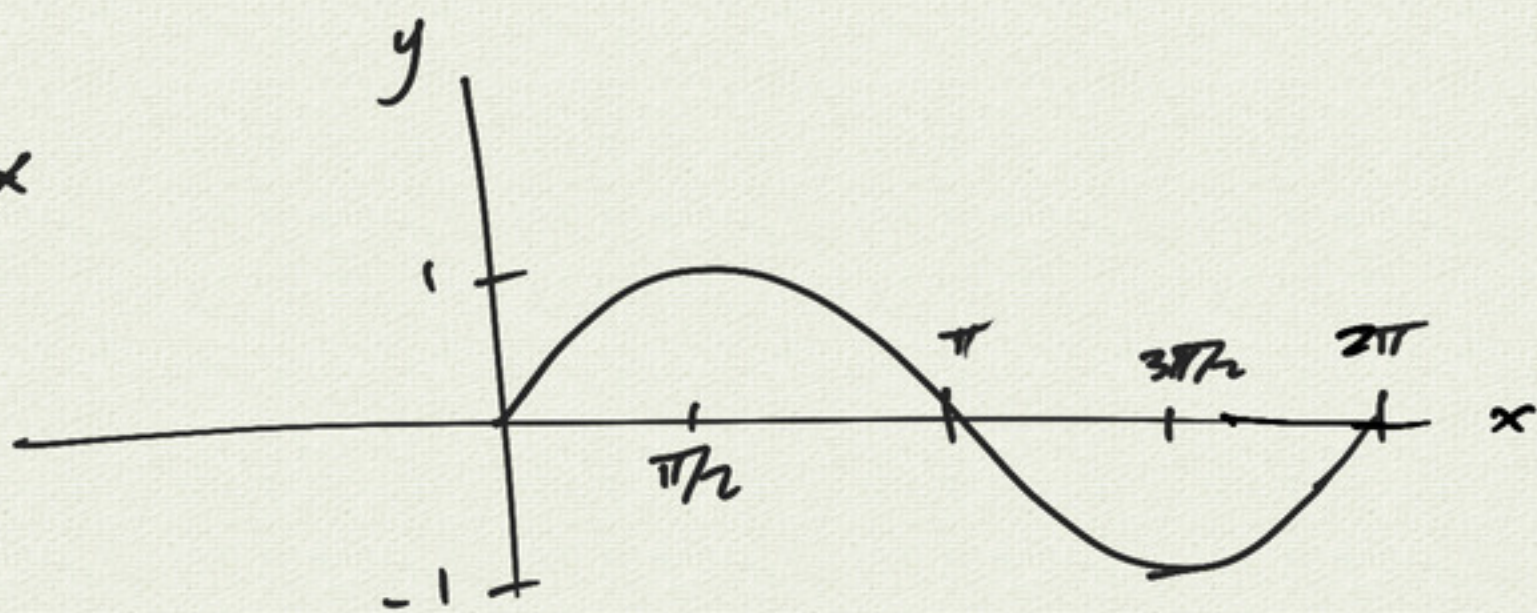
$\tan \frac{\pi}{2} = \text{undef}$

$\tan \frac{\pi}{4} = 1$

$\tan 0 = 0$

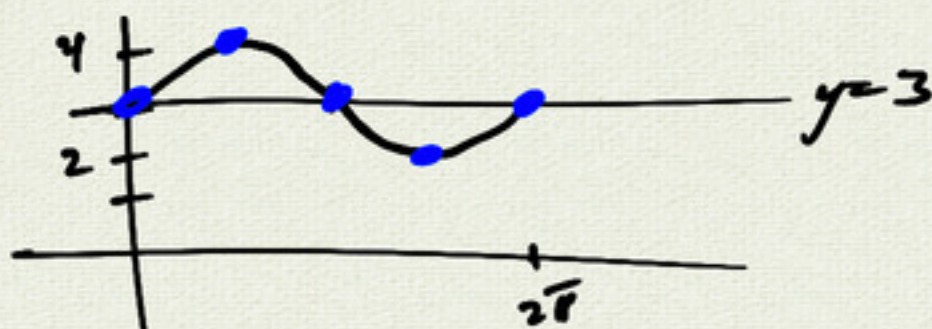


$$\sin \theta \Rightarrow y = \sin x$$



$$y = (\sin x) + 3$$

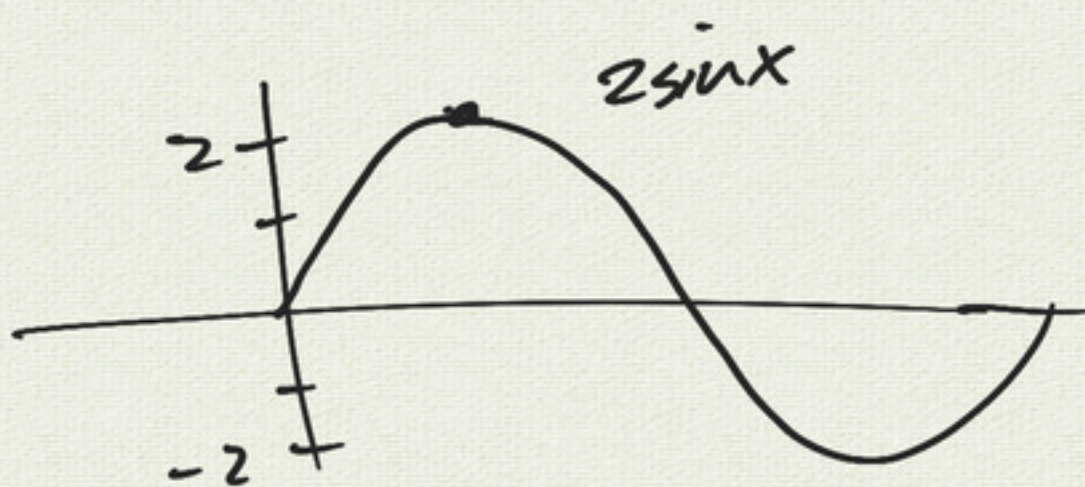
vertical shift +3



x	sin x	y = (sin x) + 3
0	0	3
$\pi/2$	1	4
π	0	3
$3\pi/2$	-1	2
2π	0	3

$$y = 2\sin x$$

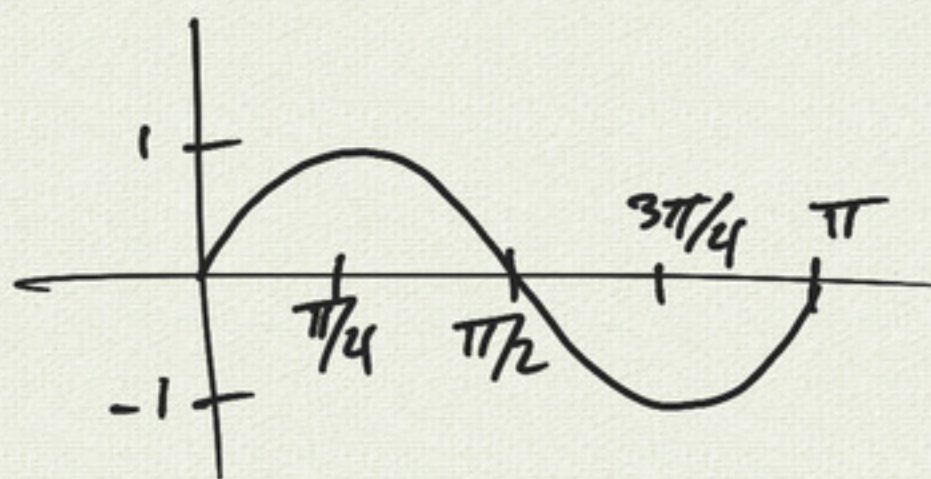
x	sin x	2 sin x
0	0	0
$\pi/2$	1	2
π	0	0
$3\pi/2$	-1	-2
2π	0	0



vertical scale $\times 2$

$$y = \sin 2x$$

x	2x	sin 2x
0	0	0
$\pi/4$	$\pi/2$	1
$\pi/2$	π	0
$3\pi/4$	$3\pi/2$	-1
π	2π	0



horizontal scale $\times \frac{1}{2}$