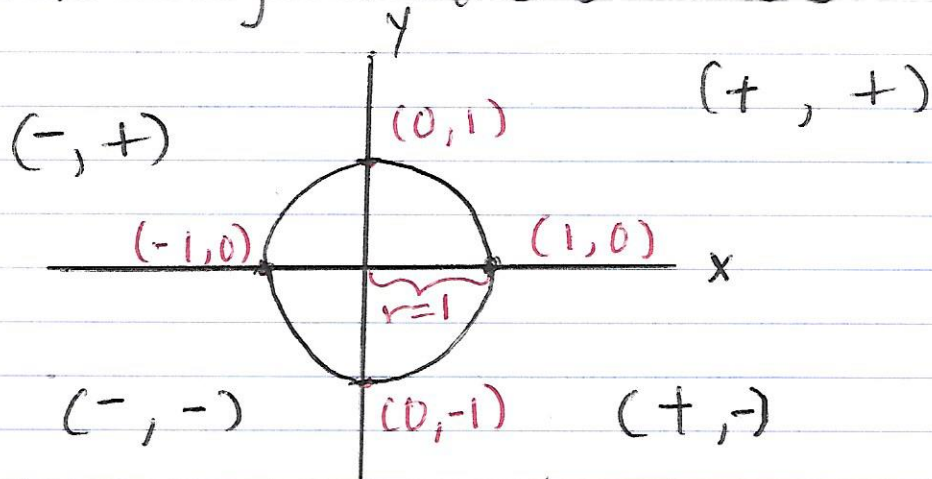


## 4.2 Trigonometric Functions



Trig  
Functions

Let "t" be a real number and (x, y) be a point on the unit circle corresponding to t.

$$\sin t = \frac{y}{r} \rightarrow \sin t = \frac{y}{1} = \sin t = y$$

$$\cos t = \frac{x}{r} \rightarrow \cos t = \frac{x}{1} = \cos t = x$$

$$\tan t = \frac{y}{x}, \quad x \neq 0$$

$$\csc t = \frac{1}{y}, \quad y \neq 0$$

$$\sec t = \frac{1}{x}, \quad x \neq 0$$

$$\cot t = \frac{x}{y}, \quad y \neq 0$$

cos      sin  
(x, y)

Ex. 1 Evaluate the Six trig functions :

t = 30° Find coordinate on unit circle:  $(\frac{\sqrt{3}}{2}, \frac{1}{2})$

$$\sin 30^\circ = \left(\frac{1}{2}\right)$$

$$\csc 30^\circ = (2)$$

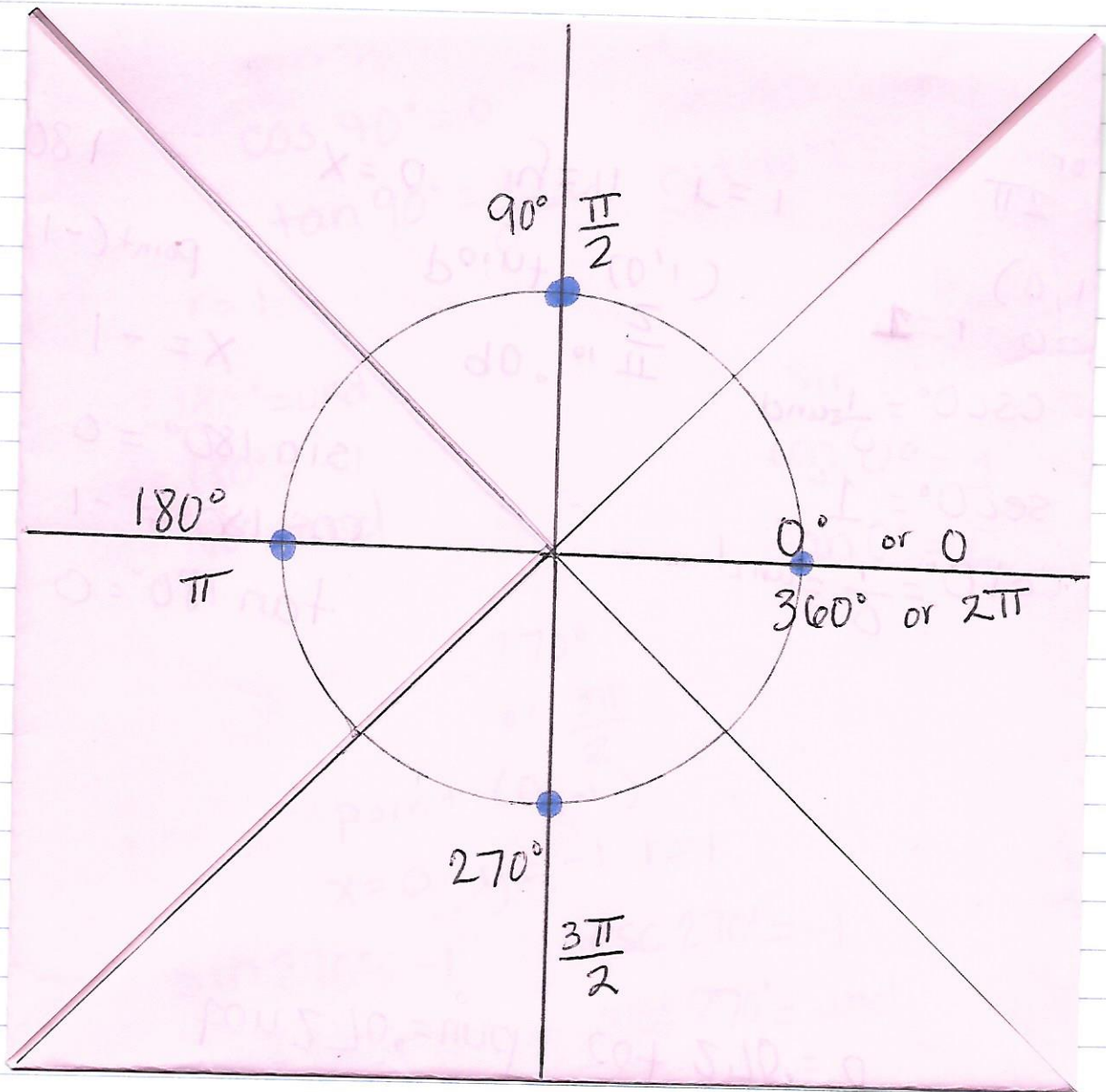
$$\cos 30^\circ = \left(\frac{\sqrt{3}}{2}\right)$$

$$\sec 30^\circ = \frac{2}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\tan 30^\circ = \frac{y}{x} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\cot 30^\circ = \frac{2\sqrt{3}}{1} = (2\sqrt{3})$$

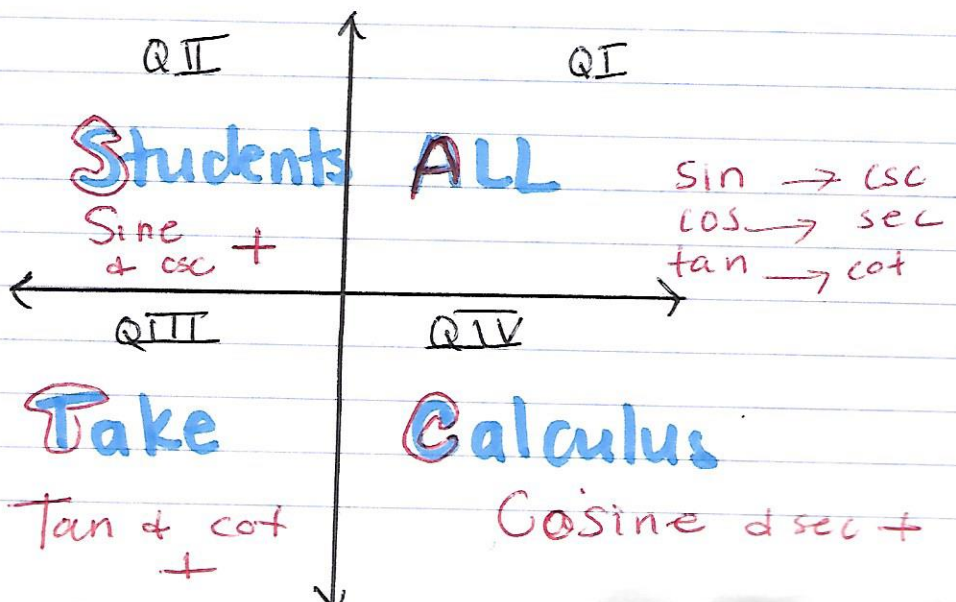
# Quadrantal Angles



# Signs of functions

Letter indicates the initial of the trig function

- Tells you where is positive



$180^\circ$  or  $\pi$   
 Point  $(-1, 0)$   
 $x = -1$   $y = 0$   $r = 1$   
 $\sin 180^\circ = 0$   
 $\cos 180^\circ = -1$   
 $\tan 180^\circ = 0$   
 $\csc 180^\circ = \text{und}$   
 $\sec 180^\circ = -1$   
 $\cot 180^\circ = \text{und}$

$90^\circ$  or  $\frac{\pi}{2}$   
 Point  $(0, 1)$   
 $x = 0$   $y = 1$   $r = 1$   
 $\sin 90^\circ = 1$   
 $\cos 90^\circ = 0$   
 $\tan 90^\circ = \frac{1}{0} = \text{und}$   
 $\csc 90^\circ = 1$   
 $\sec 90^\circ = \text{und}$   
 $\cot 90^\circ = 0$

$270^\circ$   
 or  $\frac{3\pi}{2}$   
 Point  $(0, -1)$   
 $x = 0$   $y = -1$   $r = 1$   
 $\sin 270^\circ = -1$   
 $\cos 270^\circ = 0$   
 $\tan 270^\circ = \text{und}$   
 $\csc 270^\circ = -1$   
 $\sec 270^\circ = \text{und}$   
 $\cot 270^\circ = 0$

$0^\circ$  or  $2\pi$   
 Point  $(1, 0)$   
 $x = 1$   $y = 0$   $r = 1$   
 $\sin 0^\circ = 0$   
 $\cos 0^\circ = 1$   
 $\tan 0^\circ = 0$   
 $\csc 0^\circ = \frac{1}{0} = \text{und}$   
 $\sec 0^\circ = 1$   
 $\cot 0^\circ = \frac{1}{0} = \text{und}$