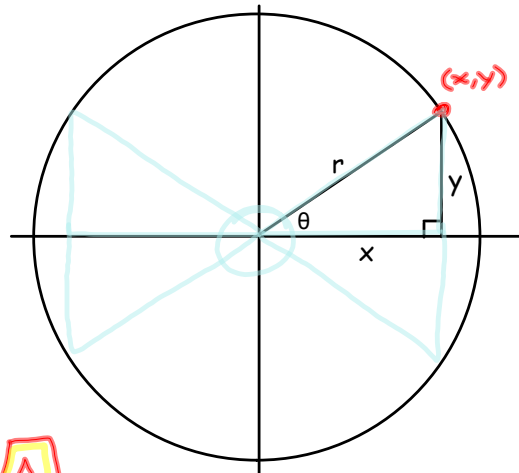


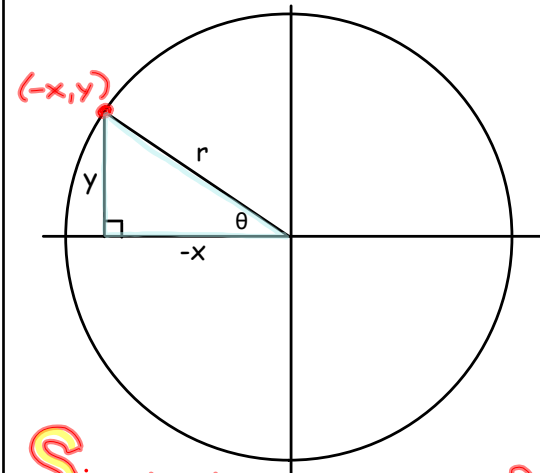
### Review of Quadrant I



$$\begin{aligned}\sin \theta &= \frac{y}{r} \\ \cos \theta &= \frac{x}{r} \\ \tan \theta &= \frac{y}{x} \\ \csc \theta &= \frac{r}{y} \\ \sec \theta &= \frac{r}{x} \\ \cot \theta &= \frac{x}{y}\end{aligned}$$

**A**ll trig ratios are positive in Q I!

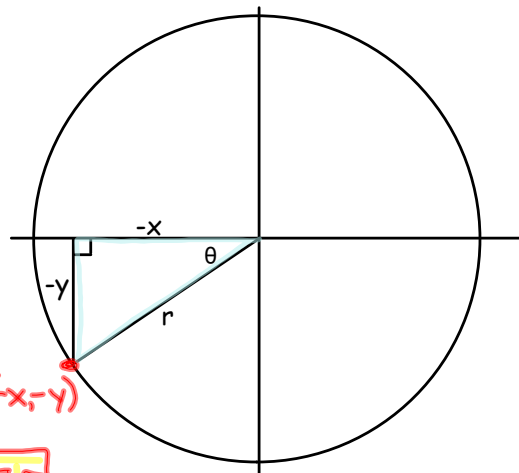
### Quadrant II



$$\begin{aligned}\sin \theta &= \frac{y}{r} \\ \cos \theta &= \frac{-x}{r} \\ \tan \theta &= \frac{y}{-x} \\ \csc \theta &= \frac{r}{y} \\ \sec \theta &= \frac{r}{-x} \\ \cot \theta &= \frac{-x}{y}\end{aligned}$$

**S**ine is always positive in Q II!

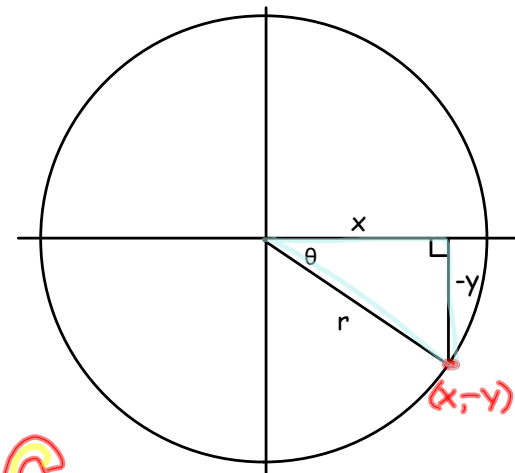
### Quadrant III



$$\begin{aligned}\sin \theta &= \frac{-y}{r} \\ \cos \theta &= \frac{-x}{r} \\ \tan \theta &= \frac{-y}{-x} \\ \csc \theta &= \frac{r}{-y} \\ \sec \theta &= \frac{r}{-x} \\ \cot \theta &= \frac{-x}{-y}\end{aligned}$$

**T**angent is always positive in Q III!

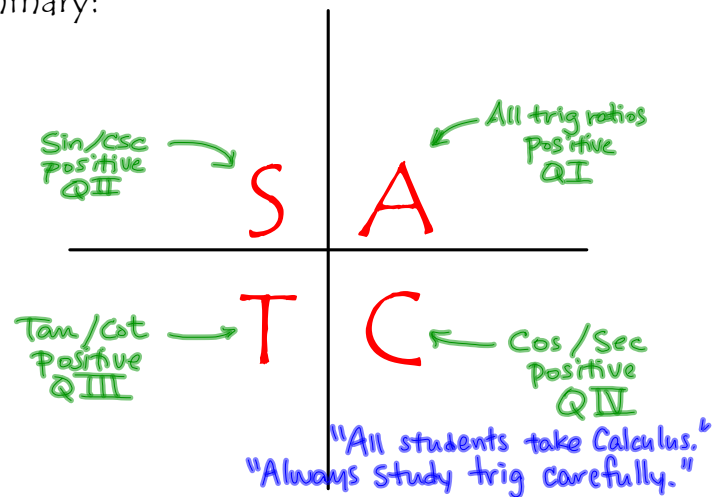
### Quadrant IV



$$\begin{aligned}\sin \theta &= \frac{-y}{r} \\ \cos \theta &= \frac{x}{r} \\ \tan \theta &= \frac{-y}{x} \\ \csc \theta &= \frac{r}{-y} \\ \sec \theta &= \frac{r}{x} \\ \cot \theta &= \frac{x}{-y}\end{aligned}$$

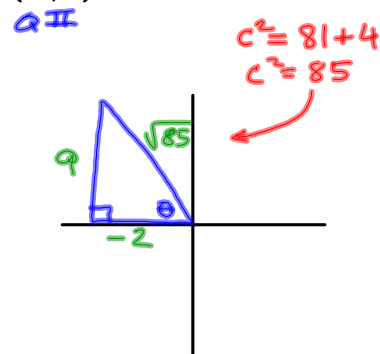
**C**osine is always positive in Q IV!

Summary:



Example 1:

Find the exact values of the six trig functions given that  $(-2, 9)$  is on the terminal side of a triangle in standard position.



$$\sin \theta = \frac{9}{\sqrt{85}} = \frac{9\sqrt{85}}{85}$$

$$\cos \theta = -\frac{2}{\sqrt{85}} = -\frac{2\sqrt{85}}{85}$$

$$\tan \theta = -\frac{9}{2}$$

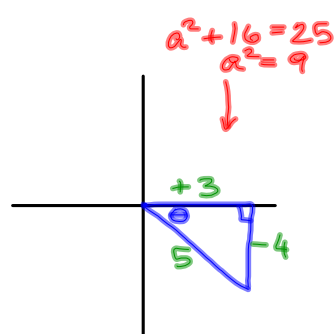
$$\csc \theta = \frac{\sqrt{85}}{9}$$

$$\sec \theta = -\frac{\sqrt{85}}{2}$$

$$\cot \theta = -\frac{2}{9}$$

Example 2:

Find the exact values of the six trig functions given that  $\sin \theta = -\frac{4}{5}$  with the constraint that  $\theta$  is in Quadrant IV.



$$\sin \theta = -\frac{4}{5}$$

$$\cos \theta = \frac{3}{5}$$

$$\tan \theta = -\frac{4}{3}$$

$$\csc \theta = -\frac{5}{4}$$

$$\sec \theta = \frac{5}{3}$$

$$\cot \theta = -\frac{3}{4}$$

Example 3:

In which quadrant lies  $\theta$  if  $\sin \theta < 0$  and  $\cos \theta > 0$ ?

