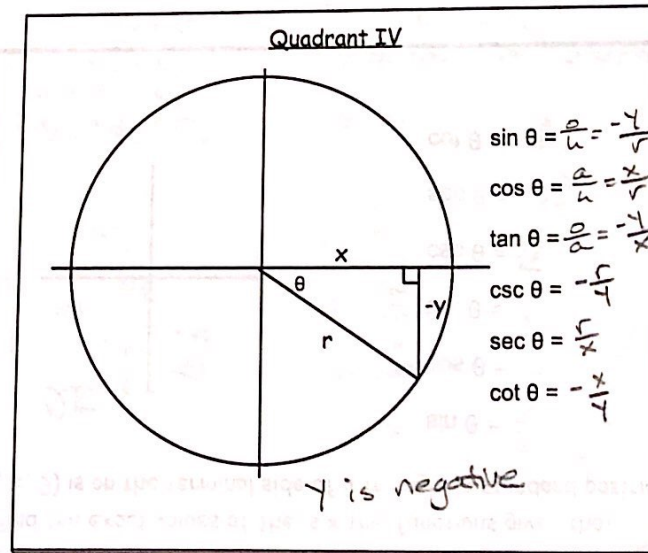
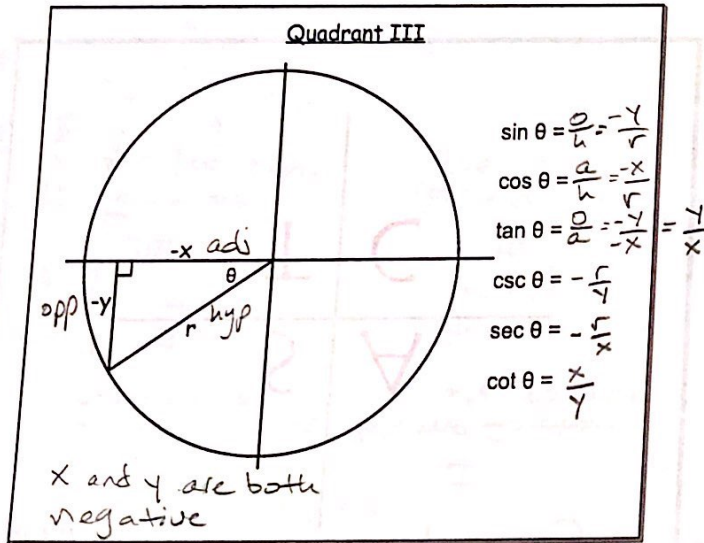
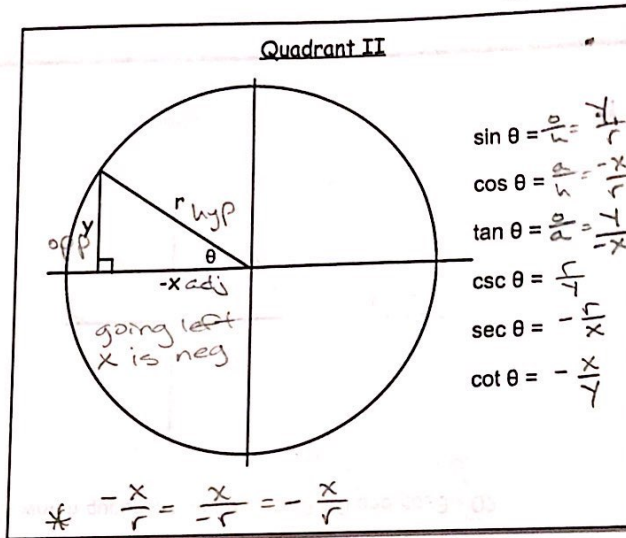
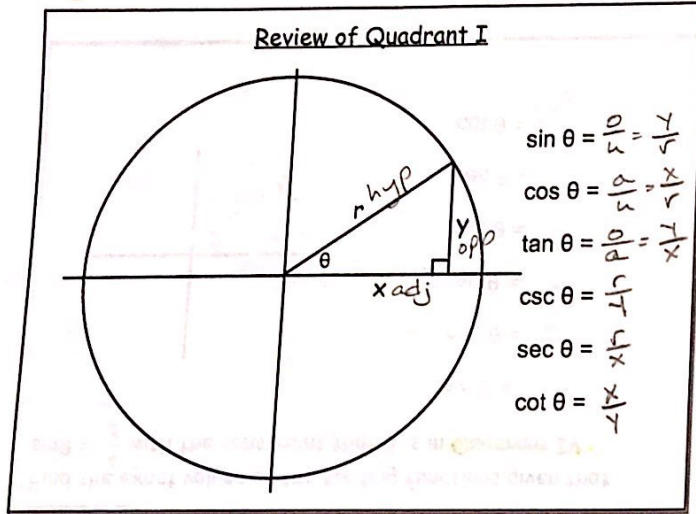
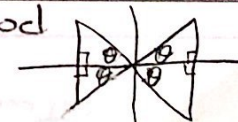


ig Ratio outside Quadrant I



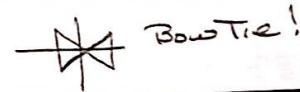
Bow Tie Method



Ratios outside Quadrant I

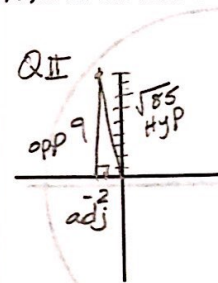
Summary: This is where your trig functions are positive.

<p>II sin + csc values are positive</p>	<p>I All trig functions are positive</p>
<p>Study S</p>	<p>A Always</p>
<p>Trig T</p>	<p>Carefully C</p>
<p>III Tan + Cot are pos. values</p>	<p>IV cos + sec are pos. values</p>



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.



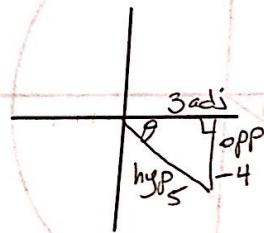
$$\begin{aligned} (-2)^2 + 9^2 &= c^2 \\ 4 + 81 &= c^2 \\ 85 &= c^2 \\ \sqrt{85} &= c \end{aligned}$$

$$\begin{aligned} \frac{y}{r} \sin \theta &= \frac{9}{\sqrt{85}} \cdot \frac{\sqrt{85}}{\sqrt{85}} = \frac{9\sqrt{85}}{85} \\ \frac{y}{r} \cos \theta &= \frac{-2}{\sqrt{85}} \cdot \frac{\sqrt{85}}{\sqrt{85}} = -\frac{2\sqrt{85}}{85} \\ \frac{y}{x} \tan \theta &= \frac{9}{-2} \\ \csc \theta &= \frac{\sqrt{85}}{9} \\ \sec \theta &= -\frac{\sqrt{85}}{2} \\ \cot \theta &= -\frac{2}{9} \end{aligned}$$

* hypotenuse is always positive!

Example 2:

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



$$\begin{aligned} \frac{y}{r} \sin \theta &= -\frac{4}{5} \\ \frac{y}{r} \cos \theta &= \frac{3}{5} \\ \frac{y}{x} \tan \theta &= -\frac{4}{3} \\ \csc \theta &= -\frac{5}{4} \\ \sec \theta &= \frac{5}{3} \\ \cot \theta &= -\frac{3}{4} \end{aligned}$$

Example 3:

In which quadrant lies θ if $\sin \theta < 0$ and $\cos \theta > 0$?
 constraint: $\sin \theta < 0$ (neg #), $\cos \theta > 0$ (pos #)

