

4.3 Unit Circle

Trig Functions for any angle given a point on a plane.

$$r = \sqrt{x^2 + y^2}$$

$$\sin \theta = \frac{y}{r}$$

$$\csc \theta = \frac{r}{y}$$

$$\cos \theta = \frac{x}{r}$$

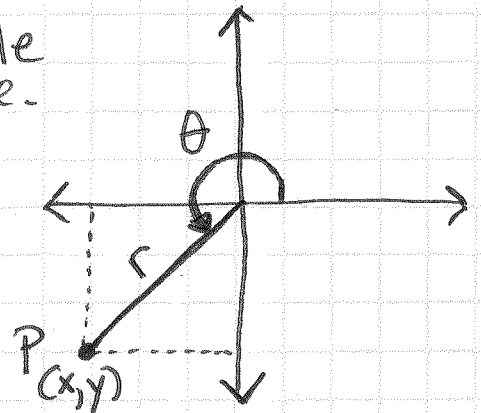
$$\sec \theta = \frac{r}{x}$$

$$\tan \theta = \frac{y}{x}$$

$$\cot \theta = \frac{x}{y}$$

$$x \neq 0$$

$$y \neq 0$$



Ex. Given Point $(8, -6)$, on the terminal side of angle θ in standard position. Find the 6 trig functions of θ

$$\text{E } r = \sqrt{8^2 + (-6)^2} = \sqrt{100} \quad r = 10$$

$$\sin \theta = \frac{-6}{10} = -\frac{3}{5}$$

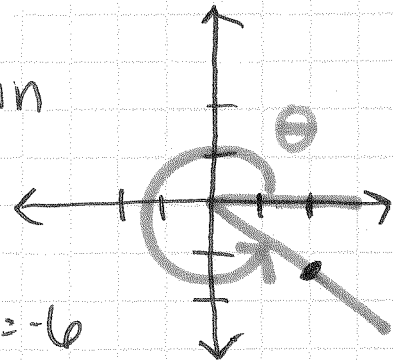
$$\csc \theta = \frac{10}{-6} = -\frac{5}{3}$$

$$\cos \theta = \frac{8}{10} = \frac{4}{5}$$

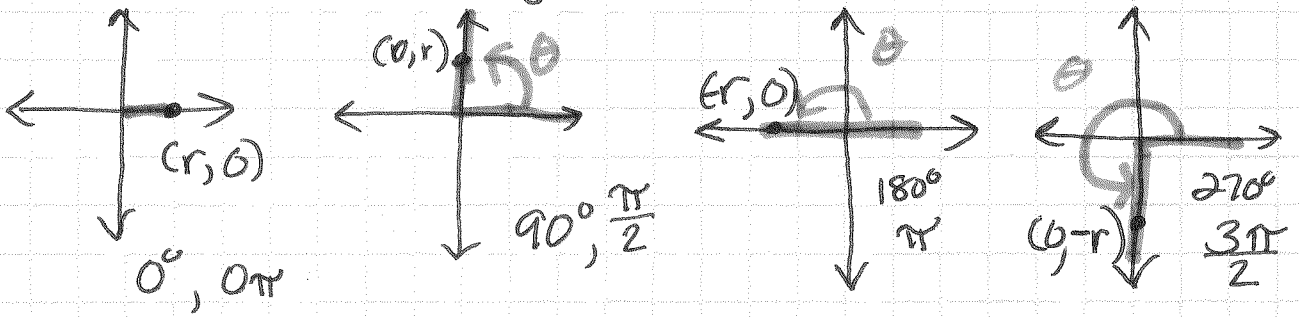
$$\sec \theta = \frac{10}{8} = \frac{5}{4}$$

$$\tan \theta = \frac{-6}{8} = -\frac{3}{4}$$

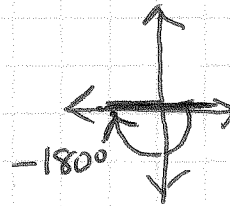
$$\cot \theta = \frac{8}{-6} = -\frac{4}{3}$$



Quadrantal Angles



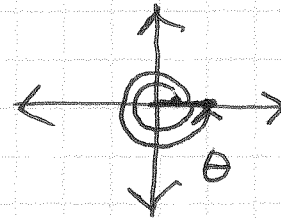
Ex: Find $\sin(-180^\circ) = 0$



Find $\sec 4\pi$

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

$$\cos \theta = \frac{r}{x} = \frac{1}{1}$$



! choose $r=1$
 $P(1, 0)$