

6.3 Trig Ratios Part II

PC 12

Trigonometric Ratios (continued)

In which quadrant(s) does the terminal arm of θ possibly lie?

$$\sin \theta < 0$$

quadrant III or IV

$$\tan \theta < 0 \text{ and } \sec \theta > 0$$

QII or QIV

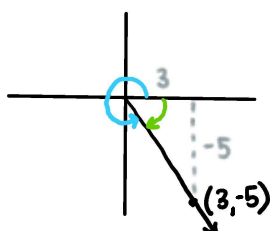
Where is $\cos \theta > 0$?

QI or QIV

(look for overlap)

quadrant IV

The point $(3, -5)$ lies on the terminal arm of θ . Sketch two coterminal angles in standard position whose terminal arm contains the point. Provide one positive and one negative angle, in radians.



$$\tan \theta = \frac{y}{x} = \frac{-5}{3}$$

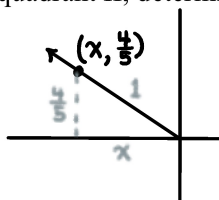
$$\theta = \tan^{-1}\left(-\frac{5}{3}\right) \quad \text{*calculator must be in radian mode*}$$

$$\theta = -1.03$$

$$-1.03 + 2\pi = 5.25$$

$$\therefore \theta = -1.03 \text{ or } 5.25$$

The point $(x, \frac{4}{5})$ lies on the terminal arm of an angle θ in standard position and on the unit circle. If the point lies in quadrant II, determine the value of x and state the six trigonometric ratios.



$$x^2 + \left(\frac{4}{5}\right)^2 = 1^2$$

$$x^2 + \frac{16}{25} = 1$$

$$x^2 = 1 - \frac{16}{25}$$

$$x^2 = \frac{9}{25}$$

$$\text{negative because QII} \quad x = -\sqrt{\frac{9}{25}}$$

$$x = -\frac{3}{5}$$

$$\sin \theta = \frac{y}{r} = \frac{4/5}{1} = \frac{4}{5}$$

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

$$\cos \theta = \frac{x}{r} = \frac{-3/5}{1} = -\frac{3}{5}$$

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

$$\tan \theta = \frac{y}{x} = \frac{4/5}{-3/5} = -\frac{4}{3}$$

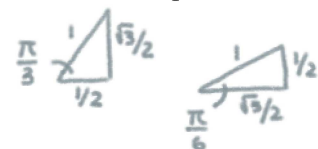
$$\cot \theta = -\frac{3}{4}$$

Determine the exact value of each expression.

$$\cos \frac{\pi}{3} + \sin \frac{\pi}{6}$$

$$= \frac{1}{2} + \frac{1}{2}$$

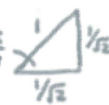
$$= 1$$



$$\left(\sec \frac{5\pi}{4}\right)^2$$

$$= (-\sqrt{2})^2$$

$$= 2$$



$$\cos \frac{\pi}{4} = \frac{1/\sqrt{2}}{1} = \frac{1}{\sqrt{2}}$$

$\frac{5\pi}{4}$ in QIII

$$\therefore \cos \frac{5\pi}{4} = -\frac{1}{\sqrt{2}}$$

$$\therefore \sec \frac{5\pi}{4} = -\sqrt{2}$$

Determine the exact measure of all angles such that $\sec \theta = 2$ in the domain $-2\pi \leq \theta < 2\pi$.

$\hookrightarrow \theta$ in QI or QIV
since $\sec \theta > 0$

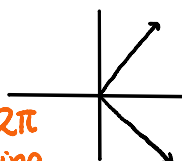
$$\cos \theta = \frac{1}{2}$$

$$\theta = \cos^{-1}\left(\frac{1}{2}\right)$$

$$\theta = \frac{\pi}{3} \leftarrow \text{QI}$$

$$\theta = \frac{5\pi}{3} \leftarrow \text{QIV}$$

subtract 2π
to determine
negative angles



$$\theta = \pm \frac{\pi}{3}, \pm \frac{5\pi}{3}$$