13-3 Trig Functions of Any Angle

To evaluate a trig function of an angle, you need to know the reference angle and whether the trig function is + or - in that quadrant.

ASTC

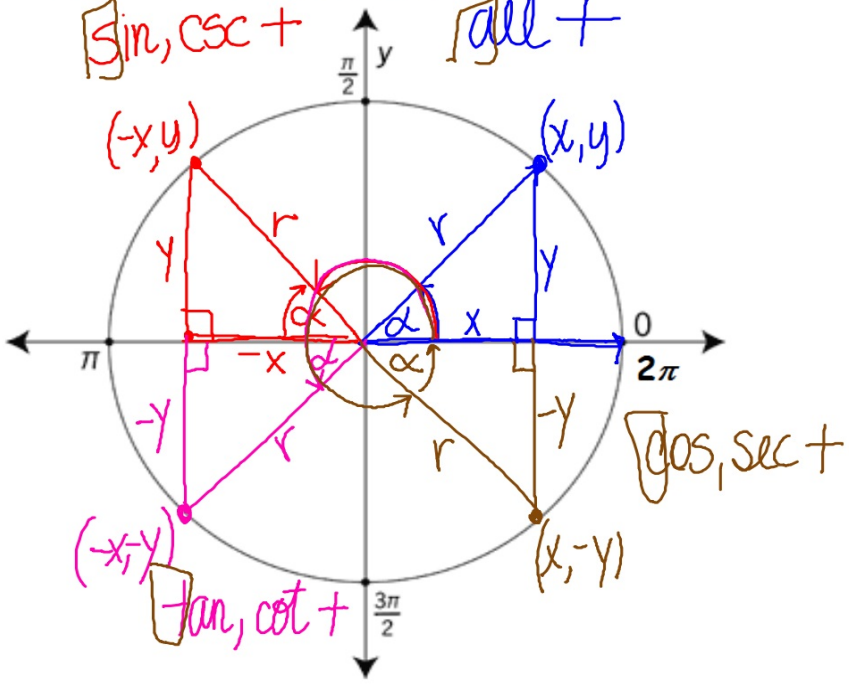
sin +	all +
tan +	cos +

Q2 $\sin 178^\circ = +$

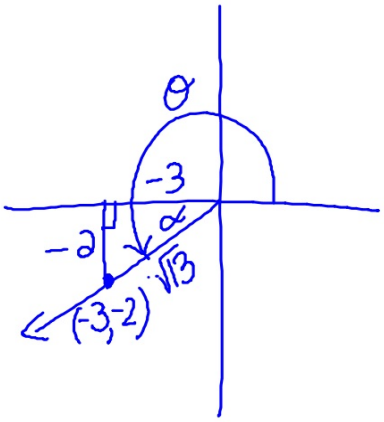
Q1 ref∠ $\sin 2^\circ = +$

Q3 $\sin 182^\circ = -$

Q4 $\sin 358^\circ = -$



ex. 1 **(-3, -2) is a point on the terminal side of angle θ .**
Evaluate the six trig functions of θ .



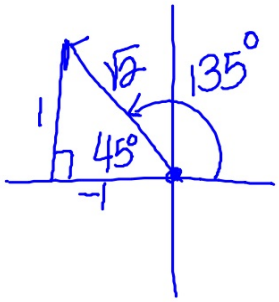
(α)

$\sin\theta = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$ $\csc\theta = \frac{\sqrt{13}}{-2}$

$\cos\theta = \frac{-3}{\sqrt{13}} = \frac{-3\sqrt{13}}{13}$ $\sec\theta = \frac{\sqrt{13}}{-3}$

$\tan\theta = \frac{2}{3}$ $\cot\theta = \frac{3}{2}$

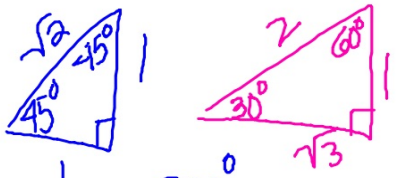
ex. 2 **Evaluate without a calculator.**



cos 135°

$= \frac{-1}{\sqrt{2}}$

$= \frac{-\sqrt{2}}{2}$



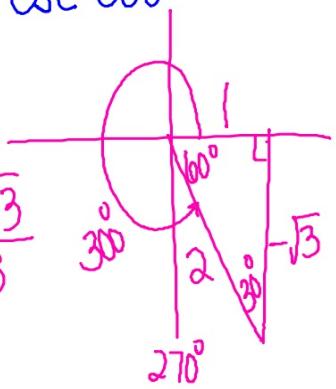
csc 660°

$-360°$

$= \csc 300°$

$= \frac{2}{-\sqrt{3}}$

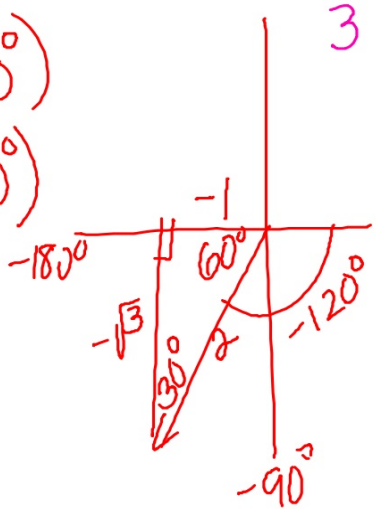
$= \frac{-2\sqrt{3}}{3}$



$\cot\left(\frac{-8\pi}{3}\right) \cdot \frac{180}{\pi} = \cot(-480°)$

$= \cot(-120°)$

$\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$



A *quadrantal angle* has its terminal side on an axis.

$\ldots, -180^\circ, -90^\circ, 0^\circ, 90^\circ, 180^\circ, 270^\circ, \ldots$

ex. 3 Evaluate all 6 trig functions of 270°.

Use CALC.

$\sin 270^\circ = -1$

$\cos 270^\circ = 0$

$\tan 270^\circ = \frac{\sin 270^\circ}{\cos 270^\circ} = \frac{-1}{0} =$ undefined

$\csc 270^\circ = -1$

$\sec 270^\circ =$ undefined $\quad \frac{1}{\cos 270^\circ} = \frac{1}{0}$

$\cot 270^\circ = 0$