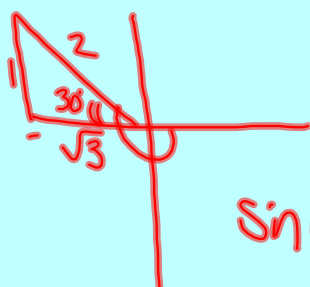


6.4 Trigonometry in the Quadrants

Review:

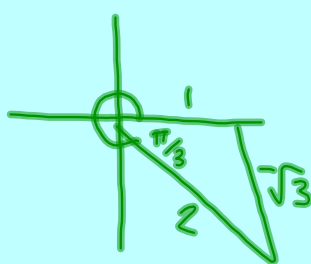
Find each one without a calculator:

$\sin(-210^\circ)$



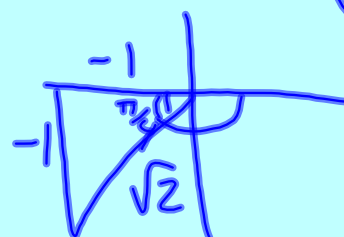
$\sin(-210^\circ) = \frac{1}{2}$

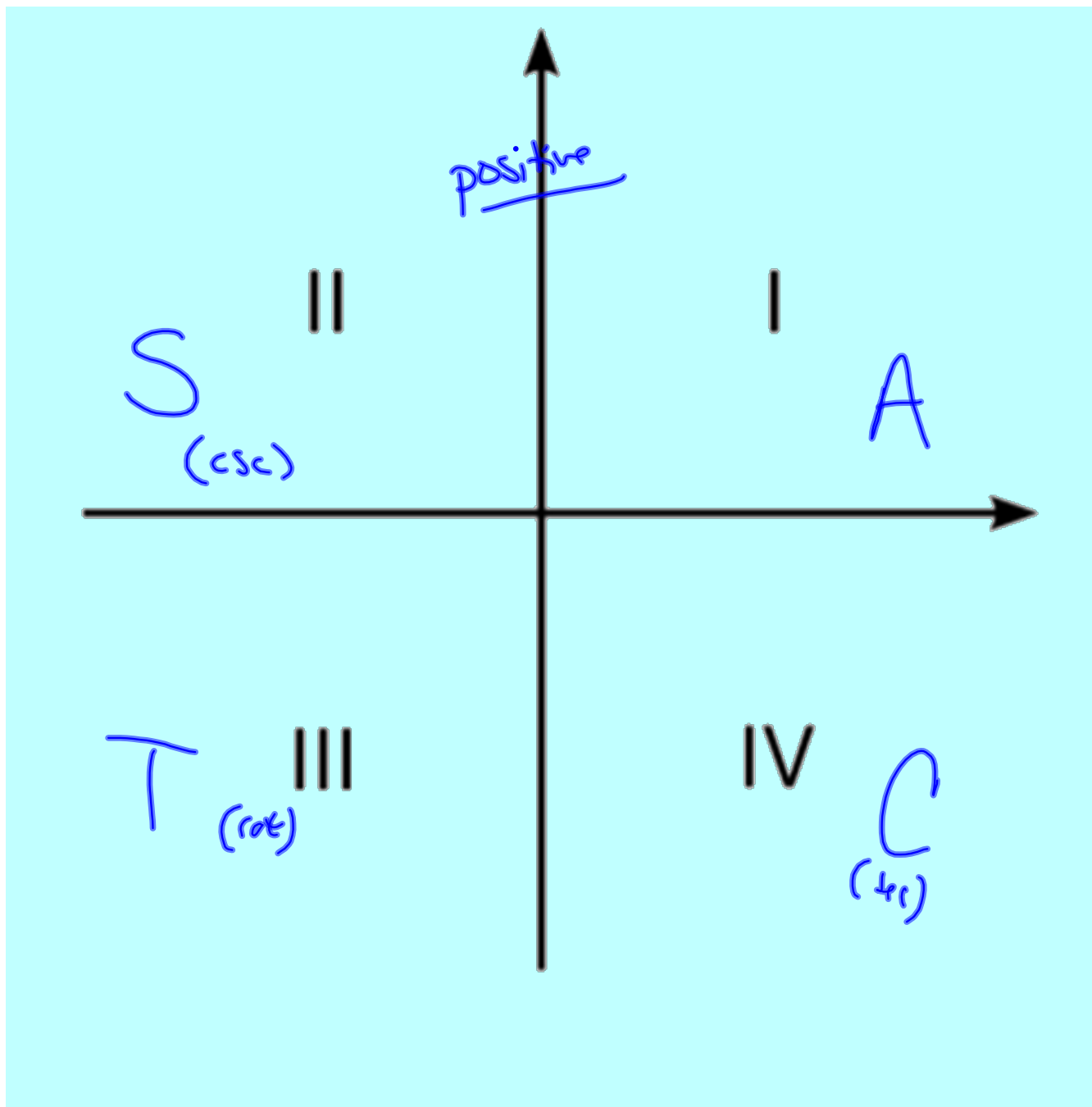
$\tan\left(\frac{5\pi}{3}\right) = -\sqrt{3}$

 $\left(\frac{\#}{\#}\right)$

$\sec\left(-\frac{3\pi}{4}\right)$

$= -\sqrt{2}$





What is the sine of 90° ?

It is convenient to use the unit circle to find trigonometric functions of *quadrantal angles*. A **quadrantal** is an angle in standard position whose terminal side lies on an axis. The measure of a quadrantal angle is always a multiple of 90° , or $\frac{\pi}{2}$ radians.

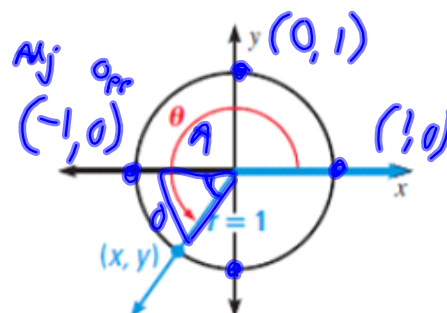
KEY CONCEPT

For Your Notebook

The Unit Circle

The circle $x^2 + y^2 = 1$, which has center $(0, 0)$ and radius 1, is called the **unit circle**. The values of $\sin \theta$ and $\cos \theta$ are simply the y -coordinate and x -coordinate, respectively, of the point where the terminal side of θ intersects the unit circle.

$$\sin \theta = \frac{y}{r} = \frac{y}{1} = y \qquad \cos \theta = \frac{x}{r} = \frac{x}{1} = x$$



So... $\sin(90) =$

*THINK: 90 is the point (0,1)

Use the unit circle to evaluate the six trigonometric functions of $\theta = 270^\circ$.

Solution

Draw the unit circle, then draw the angle $\theta = 270^\circ$ in standard position. The terminal side of θ intersects the unit circle at $(0, -1)$, so use $x = 0$ and $y = -1$ to evaluate the trigonometric functions.

$$\sin \theta = \frac{y}{r} = \frac{-1}{1} = -1$$

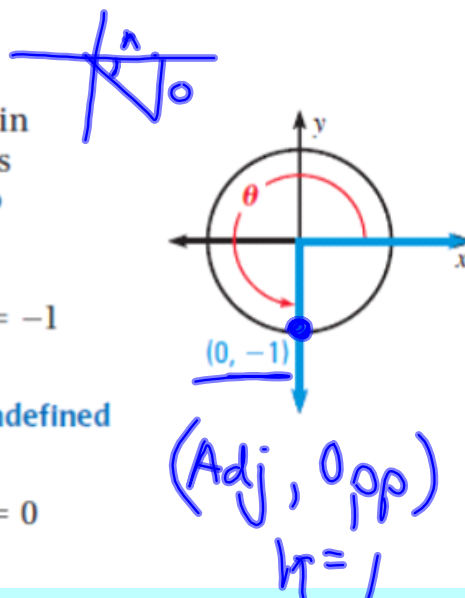
$$\csc \theta = \frac{r}{y} = \frac{1}{-1} = -1$$

$$\cos \theta = \frac{x}{r} = \frac{0}{1} = 0$$

$$\sec \theta = \frac{r}{x} = \frac{1}{0} \text{ undefined}$$

$$\tan \theta = \frac{y}{x} = \frac{-1}{0} \text{ undefined}$$

$$\cot \theta = \frac{x}{y} = \frac{0}{-1} = 0$$



PRACTICE $\frac{11}{4} = 2\frac{3}{4}$

Find all 6 trig functions:

ex.1 $11\pi/4$

$$\sin \frac{11\pi}{4} = \frac{1}{\sqrt{2}}$$

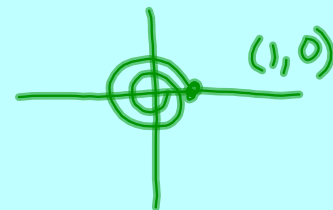
$$\csc \frac{11\pi}{4} = \sqrt{2}$$

$$\cos \frac{11\pi}{4} = -\frac{1}{\sqrt{2}}$$

$$\sec \frac{11\pi}{4} = -\sqrt{2}$$

$$\tan \frac{11\pi}{4} = -1$$

$$\cot \frac{11\pi}{4} = -1$$

ex.2 -4π

$$\sin(4\pi) = \frac{0}{1} = 0$$

$$\csc(4\pi) = \frac{1}{0} = \text{undefined}$$

$$\cos(-4\pi) = \frac{1}{1} = 1$$

$$\sec(-4\pi) = \frac{1}{1} = 1$$

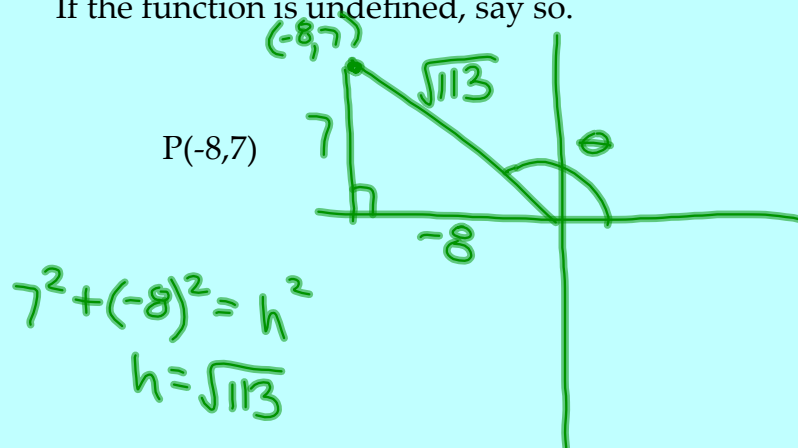
$$\tan(-4\pi) = \frac{0}{1} = 0$$

$$\cot(-4\pi) = \frac{1}{0} = \emptyset$$

Opp = 0
Adj = 1
Hyp = 1

Ex.3 Point P is on the terminal side of angle θ . Evaluate the 6 trigonometric functions of θ .

If the function is undefined, say so.



$$\sin \theta = \frac{7}{\sqrt{113}}$$

$$\csc \theta = \frac{\sqrt{113}}{7}$$

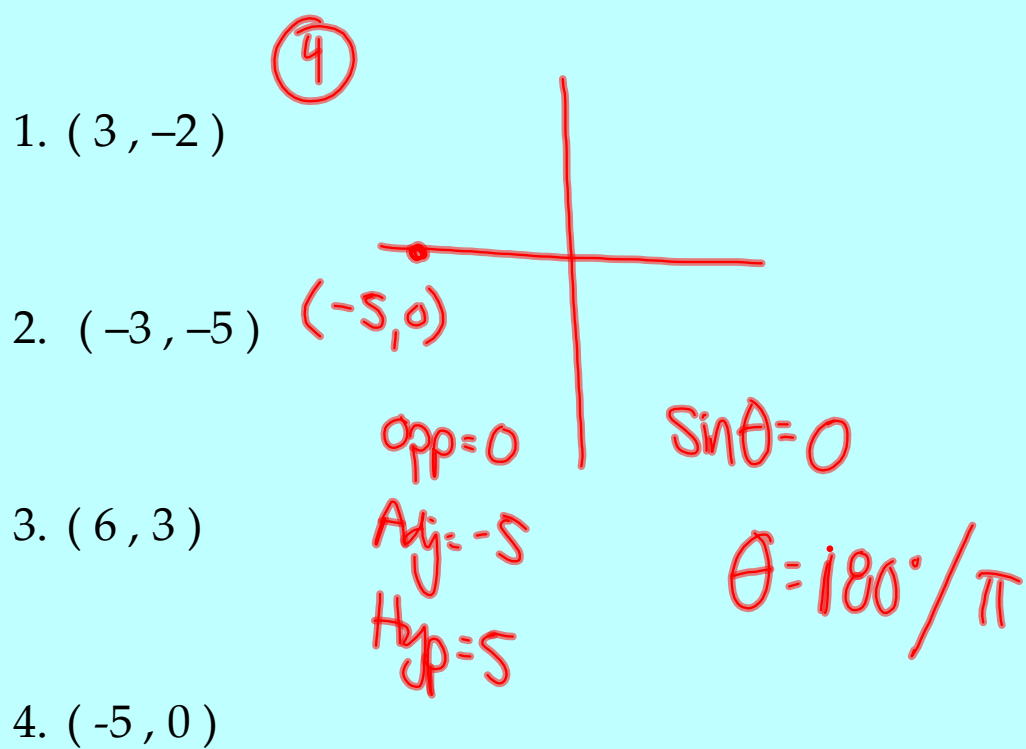
$$\cos \theta = \frac{-8}{\sqrt{113}}$$

$$\sec \theta = -\frac{\sqrt{113}}{8}$$

$$\tan \theta = \frac{7}{-8}$$

$$\cot \theta = \frac{-8}{7}$$

Find values of all six functions, alpha and theta for :



Show

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{O}{H}}{\frac{A}{H}}$$

$$\frac{O}{\cancel{H}} \cdot \frac{\cancel{H}}{A} = \frac{O}{A}$$

Homework Assignment:

page 404:19-30 all; 425-426:
31-46 all