

PreCalculus Class Notes TFG4 Tangent, Cotangent, Secant, Cosecant

Review six trig functions in TFG2 class notes.

Know these identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

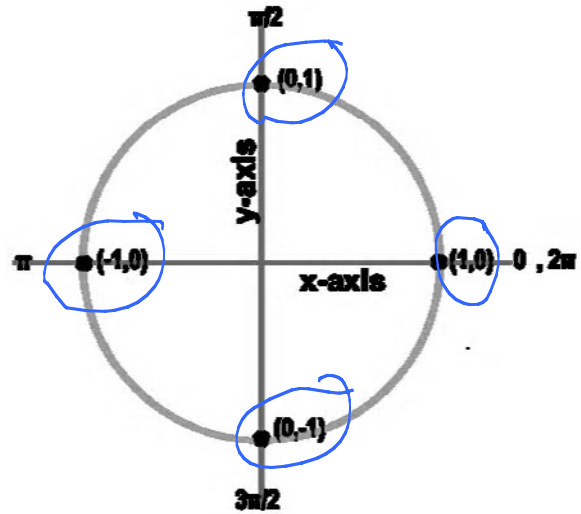
$$\cot = \frac{1}{\tan \theta}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta}$$

$$\csc \theta = \frac{1}{\sin \theta}$$

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

Trig Values for Quadrantal Angles



	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
$\sin \theta$	0	1	0	-1	0
$\cos \theta$	1	0	-1	0	1
$\tan \theta$	0	DNE	0	undefined	0
$\csc \theta$	DNE	1	DNE	-1	DNE
$\sec \theta$	1	DNE	-1	DNE	1
$\cot \theta$	DNE	0	DNE	0	DNE

Handwritten notes on the left side of the table:

- Blue arrows pointing to the y-axis label and the $\sin \theta$ row.
- Red arrows pointing to the x-axis label and the $\cos \theta$ row.
- Green arrows pointing to the $\tan \theta$ row.
- Handwritten formula: $\frac{\cos \theta}{\sin \theta}$ in green.

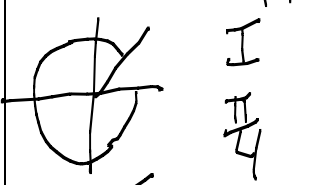
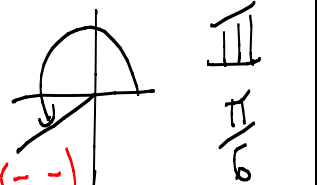
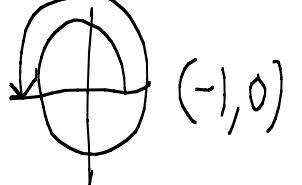
Handwritten notes on the right side of the table:

- Red text: "DNE where $\cos \theta = 0$ " with arrows pointing to the DNE entries in the $\tan \theta$ and $\sec \theta$ rows.
- Black text: "DNE where $\sin \theta = 0$ " with arrows pointing to the DNE entries in the $\csc \theta$ and $\cot \theta$ rows.

Fill in

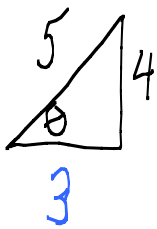
	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$
sin θ	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos θ	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tan θ	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$
csc θ	2	$\frac{2}{\sqrt{2}}$ OR $\sqrt{2}$	$\frac{2}{\sqrt{3}}$ OR $\frac{2\sqrt{3}}{3}$
sec θ	$\frac{2\sqrt{3}}{3}$	$\sqrt{2}$	2
cot θ	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$

Determine the six trig function values using the unit circle

	$-\frac{7\pi}{4}$ $-\frac{1}{4}\pi$	$\frac{7\pi}{6}$ $\frac{1}{6}\pi$	3π
Diagram			
sin θ	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0
cos θ	$\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1
tan θ	1	$\frac{1}{\sqrt{3}}$	0
csc θ	$\sqrt{2}$	2	DNE
sec θ	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	-1
cot θ	1	$\sqrt{3}$	DNE

Right triangle trig with all trig values

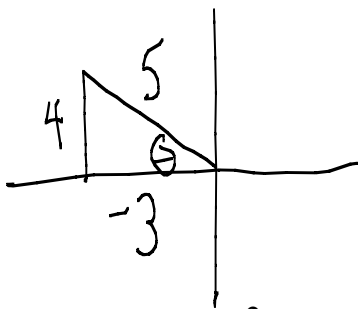
Example: If $\sin \theta = \frac{4}{5}$ and $\cos \theta < 0$, find the values of other five trigonometric functions.



sin pos
cos neg

QII

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



Example: If $\sec \theta = \frac{2}{\sqrt{3}}$ and $\csc \theta = -2$, find values of the other four trigonometric functions.

$$\cos \theta = \frac{\sqrt{3}}{2}$$

$$\sin \theta = -\frac{1}{2}$$

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}$$

$$-\frac{1}{2} \cdot \frac{2}{\sqrt{3}} = -\frac{1}{\sqrt{3}}$$

$$\cot \theta = -\sqrt{3}$$

