

Solving Trigonometric Equations

$$\cos^2 \theta - \frac{1}{2} \cos \theta = 0, \quad -360^\circ \leq \theta \leq 720^\circ$$

$$\cos \theta \left(\cos \theta - \frac{1}{2} \right) = 0$$

$$\cos \theta = 0$$

$$\theta = 90^\circ, 270^\circ$$

$$\theta = -270^\circ, -90^\circ$$

$$\theta = 450^\circ, 630^\circ$$

$$\cos \theta - \frac{1}{2} = 0$$

$$\cos \theta = \frac{1}{2} \quad \text{ref} = 60^\circ$$

Quad 1

$$\theta = 60^\circ$$

$$\theta = -300^\circ$$

$$\theta = 420^\circ$$

Quad 4

$$\theta = 300^\circ$$

$$\theta = -60^\circ$$

$$\theta = 660^\circ$$

$$\sin^2 \theta - \frac{\sqrt{3}}{2} \sin \theta = 0, \quad -360^\circ \leq \theta \leq 360^\circ$$

$$\sin \theta \left(\sin \theta - \frac{\sqrt{3}}{2} \right) = 0$$

$$\sin \theta = 0$$

$$\theta = 0^\circ, 180^\circ, 360^\circ$$

$$\theta = -360^\circ, -180^\circ$$

$$\sin \theta - \frac{\sqrt{3}}{2} = 0$$

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

$$\text{ref} = 60^\circ$$

Quad 1

$$\theta = 60^\circ$$

$$\theta = -300^\circ$$

Quad 2

$$\theta = 120^\circ$$

$$\theta = -240^\circ$$

$$2\sin^2 \theta + \sin \theta - 1 = 0 \quad 0 \leq \theta \leq 360$$

$$\begin{aligned} 2 \times -1 &= -2 \\ 2 + -1 &= 1 \end{aligned}$$

$$(2\sin^2 \theta + 2\sin \theta - \sin \theta - 1) = 0$$

$$2\sin \theta (\sin \theta + 1) - 1(\sin \theta + 1) = 0$$

$$(2\sin \theta - 1)(\sin \theta + 1) = 0$$

$$2\sin \theta - 1 = 0$$

$$2\sin \theta = 1$$

$$\sin \theta = \frac{1}{2} \text{ ref} = 30^\circ$$

Quad 1

$$\theta = 30^\circ$$

Quad 2

$$\theta = 150^\circ$$

$$\sin \theta + 1 = 0$$

$$\sin \theta = -1$$

$$\theta = 270^\circ$$

$$2 \cos^2 \theta - 7 \cos \theta + 3 = 0, 0 \leq \theta \leq 360$$

$$\underline{-6} \times \underline{-1} = 6$$

$$\underline{-6} + \underline{-1} = -7$$

$$(2 \cos^2 \theta - 1 \cos \theta)(-6 \cos \theta + 3) = 0$$

$$\cos \theta (2 \cos \theta - 1) - 3(2 \cos \theta - 1) = 0$$

$$(\cos \theta - 3)(2 \cos \theta - 1) = 0$$

$$\cos \theta - 3 = 0$$

$$\cos \theta = 3$$

No Solution

$$2 \cos \theta - 1 = 0$$

$$2 \cos \theta = 1$$

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

ref = 60

Quad 1

$$\theta = 60^\circ$$

Quad 4

$$\theta = 300^\circ$$

Solving Trigonometric Equations Using a Graph

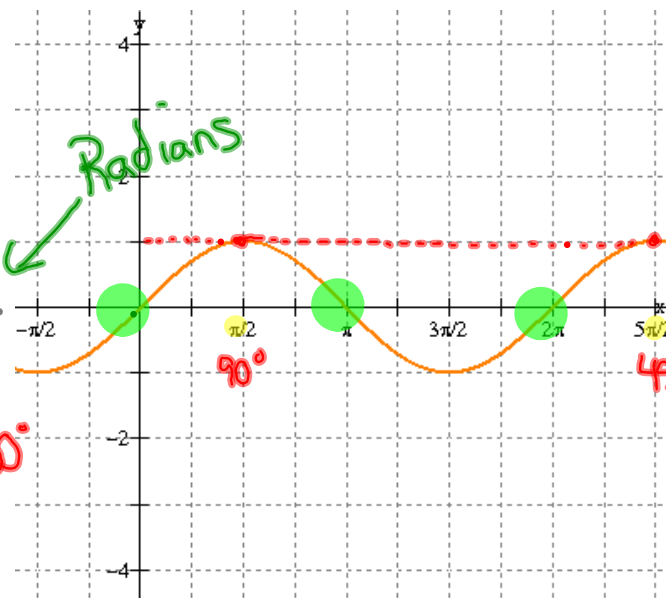
$$y = \sin \theta$$

Where is

$$\sin \theta = 1$$

$$\theta = \frac{\pi}{2}, \frac{5\pi}{2}$$

$$\theta = 90^\circ, 450^\circ$$



Where is

$$\sin \theta = 0$$

$$\theta = 0, \pi, 2\pi$$

$$\theta = 0^\circ, 180^\circ, 360^\circ$$

Exercise 7.7

Finish #6-8

* Review Sheet (Omit 7 b,d)

Ex: 7.7

$$e) \quad 2\sin^2\theta + 5\sin\theta - 3 = 0$$

$$-360^\circ \leq \theta \leq 360^\circ$$

$$(2\sin^2\theta - 1\sin\theta)(\sin\theta + 3) = 0$$

$$-1 \times 6 = -6$$

$$\sin\theta(2\sin\theta - 1) + 3(2\sin\theta - 1) = 0$$

$$-1 + 6 = 5$$

$$(\sin\theta + 3)(2\sin\theta - 1) = 0$$

$$\sin\theta + 3 = 0$$

$$\sin\theta = -3$$

Not Possible

$$2\sin\theta - 1 = 0$$

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

$$\text{ref} = 30^\circ$$

Q1

$$\theta = \text{ref}$$

$$\theta = 30^\circ$$

$$\theta = -330^\circ$$

Q2

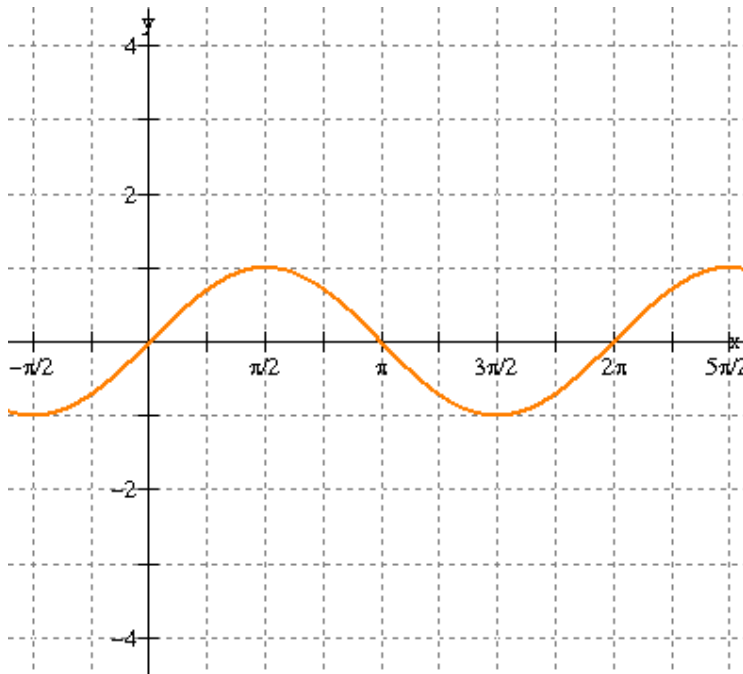
$$\theta = 180 - \text{ref}$$

$$\theta = 150^\circ$$

$$\theta = -210^\circ$$

Graphs of Other Trig Functions

$$y = \sin \theta$$



What would the graph of $\csc \theta$ look like?

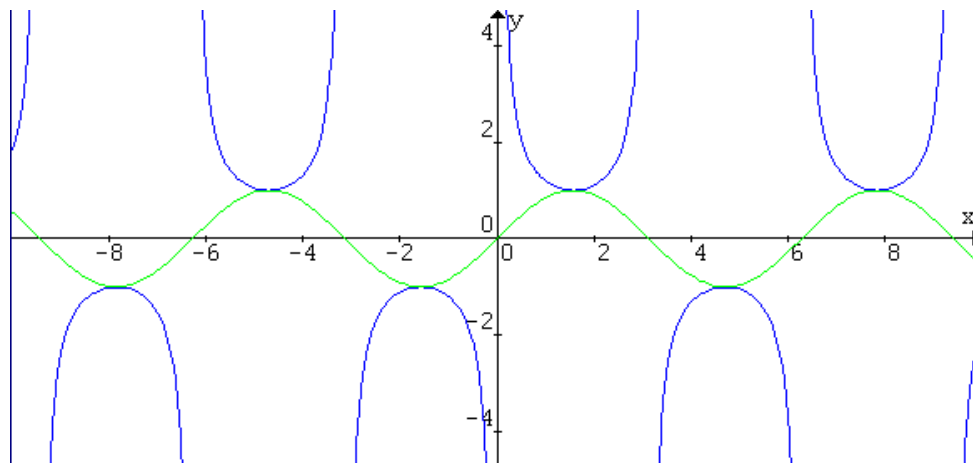
REMEMBER:

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

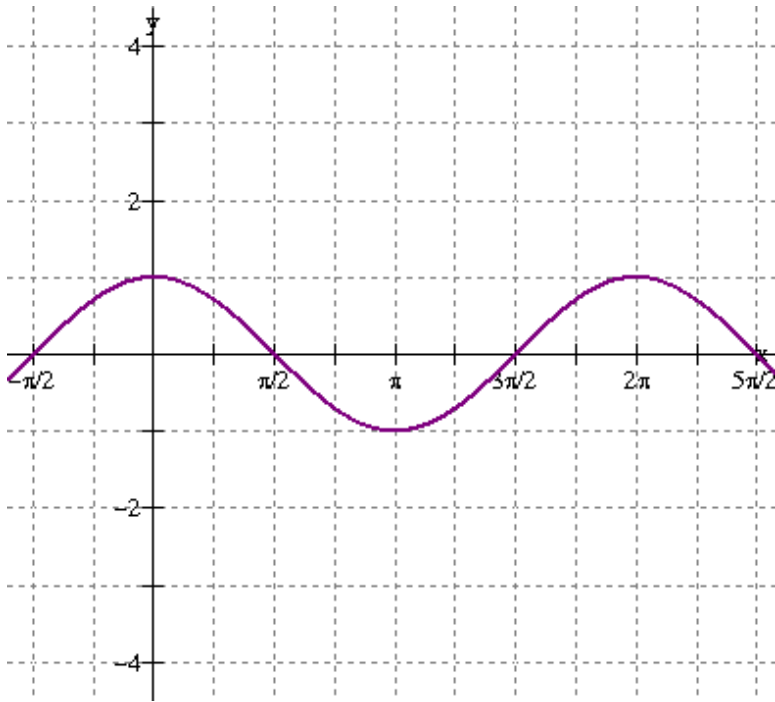
where $\sin x = 0$,
 $\csc x$ is undefined

$$y = \sin x$$

$$y = \csc x$$



$$y = \cos \theta$$



What would the graph of $\sec \theta$ look like?

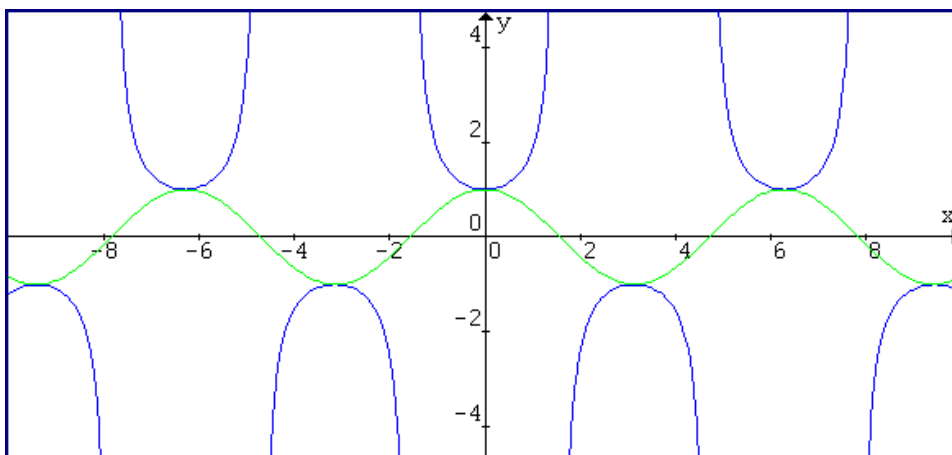
REMEMBER:

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

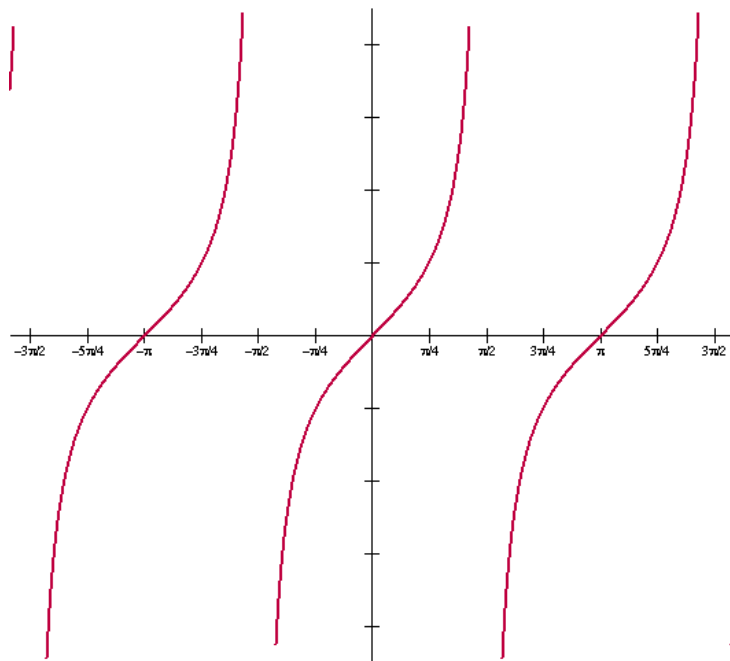
where $\cos x = 0$,
 $\sec x$ is undefined

$$y = \cos x$$

$$y = \sec x$$



$$y = \tan \theta$$



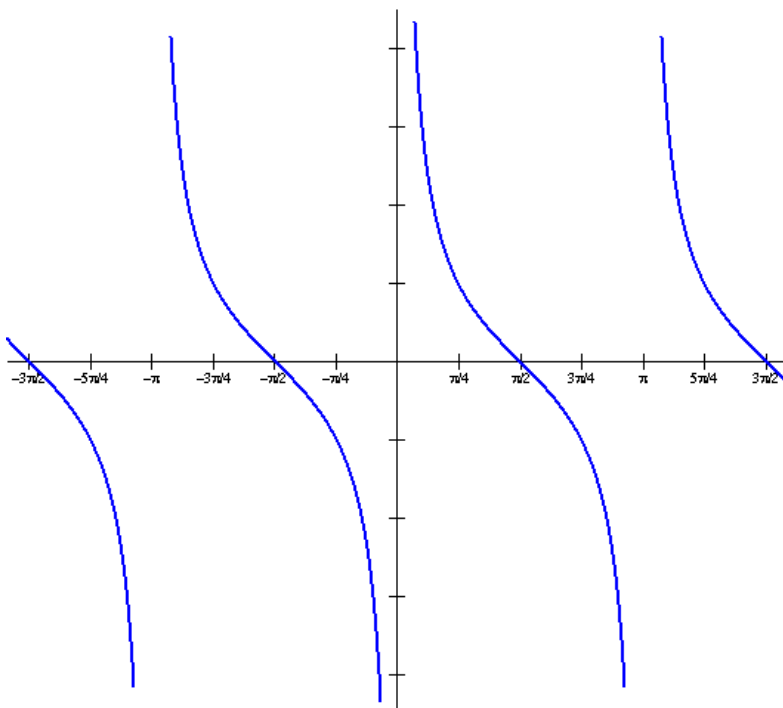
What would the graph of $\cot \theta$ look like?

REMEMBER:

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

where $\tan x = 0$,
 $\cot x$ is undefined

$$y = \cot \theta$$



Homework