

Minds On

Warm-Up Question

Sketch a rough graph of the function below on the interval $0 \leq x \leq 2\pi$.

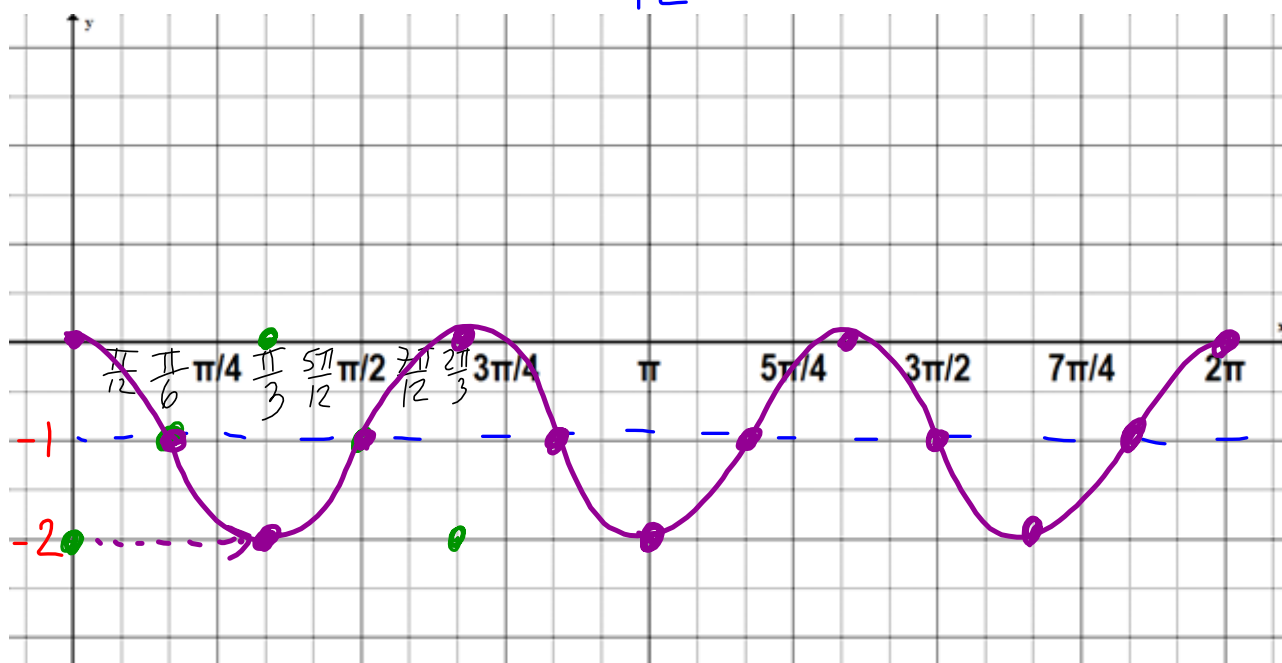
$$y = -\cos\left(3\left(x - \frac{\pi}{3}\right)\right) - 1$$

axis: $y = -1$
 amplitude: 1
 max: $y = 0$
 min: $y = -2$
 period: $\frac{2\pi}{3}$

$$y = -\cos(3x) - 1$$

$$y = -\cos\left(3\left(x - \frac{\pi}{3}\right)\right) - 1$$

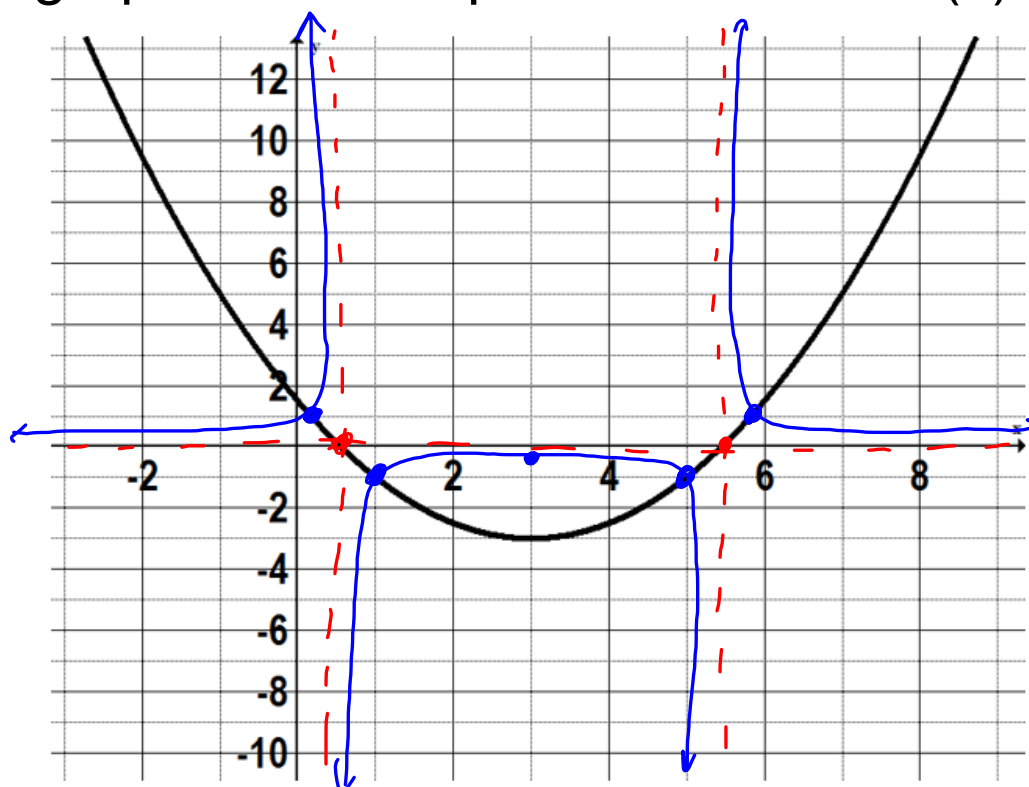
$$\frac{\pi}{12}$$



Minds On

Sketching the Reciprocal

Given the graph of $f(x)$ as seen below, sketch the graph of the reciprocal function $1/f(x)$.



Properties of Reciprocal Functions

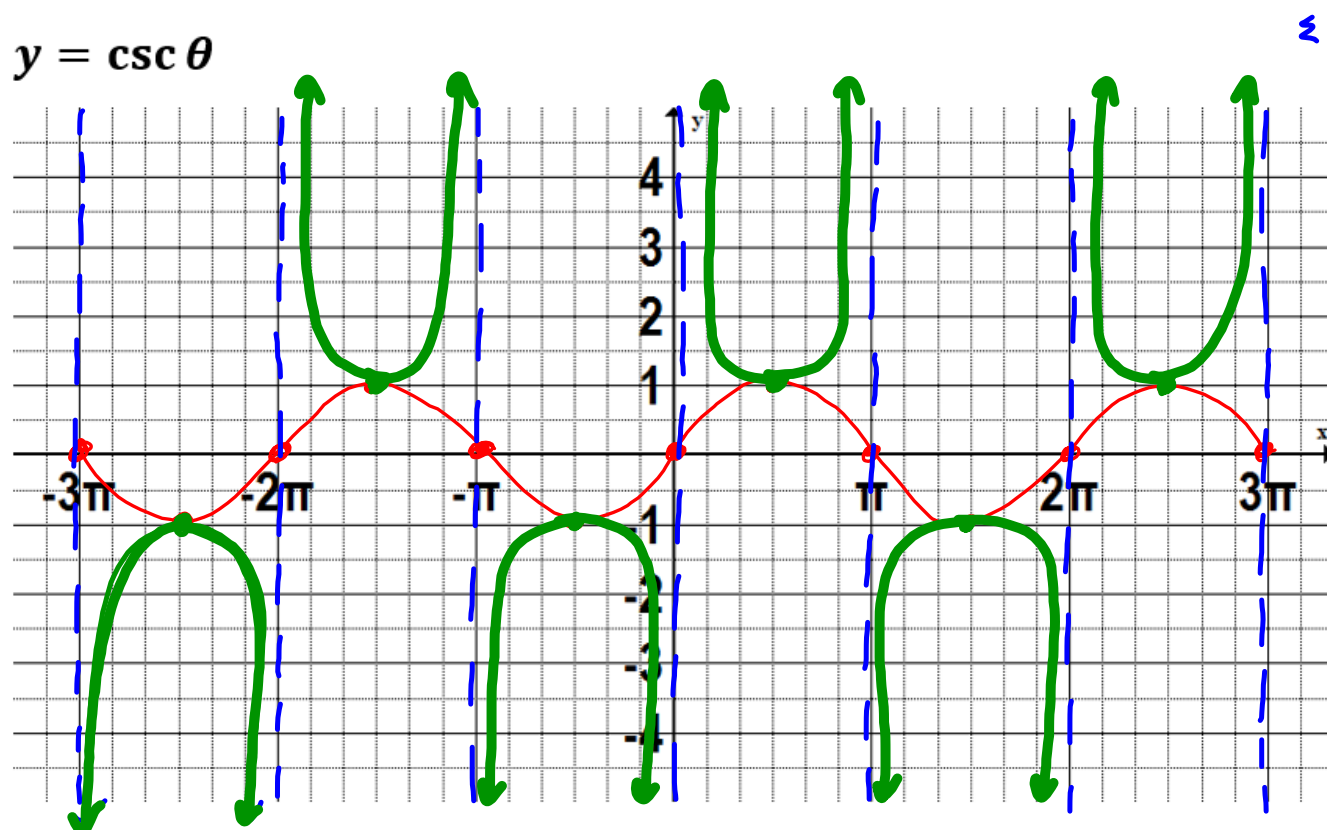
$f(x)$	Positive	Negative	Increasing	Decreasing	Approaches 0	Approaches ∞
$\frac{1}{f(x)}$	Positive	Negative	Decreasing	Increasing	Approaches ∞	Approaches 0

$f(x)$	Equals Zero	Vertical Asymptote	Equals 1	Equals -1
$\frac{1}{f(x)}$	Asymptote	Zero	Equals 1	Equals -1

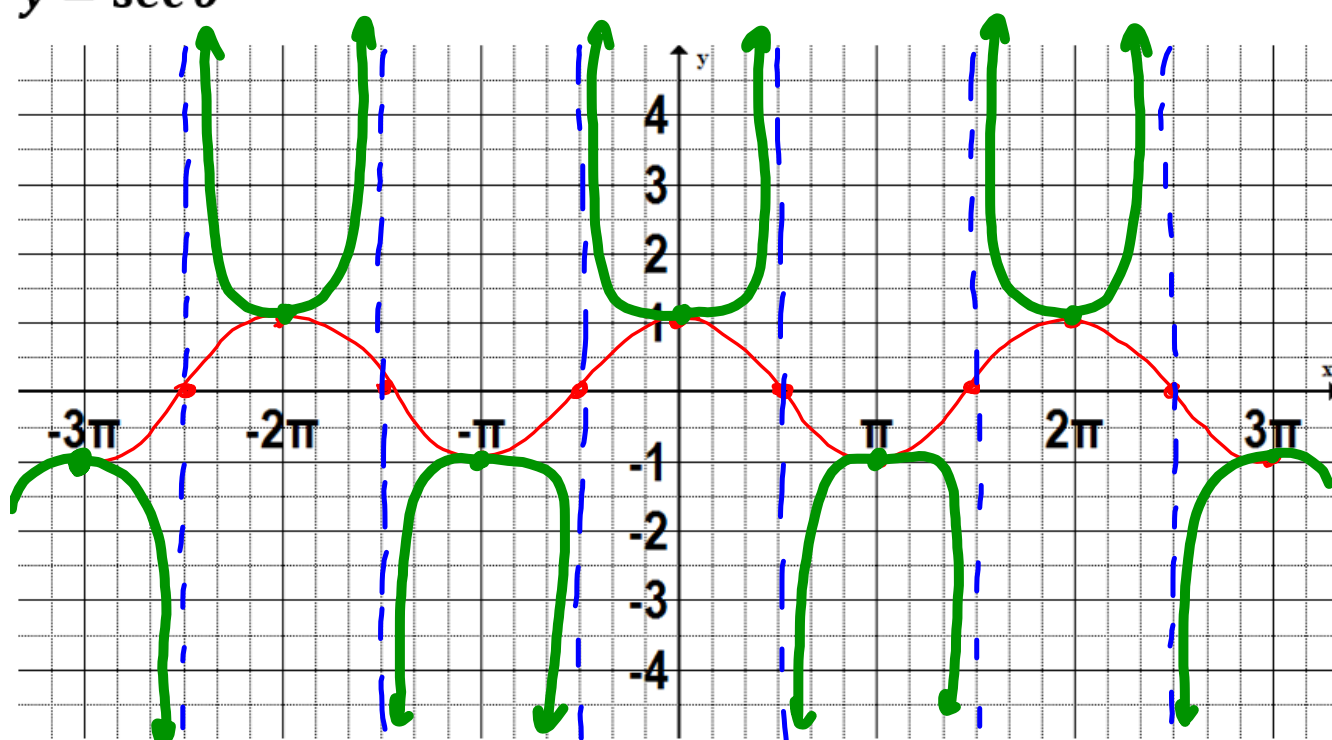
Action

Graphing the Reciprocal Trigonometric Functions

For each reciprocal function, first graph its primary function, then use the properties of reciprocal functions to graph the reciprocal.

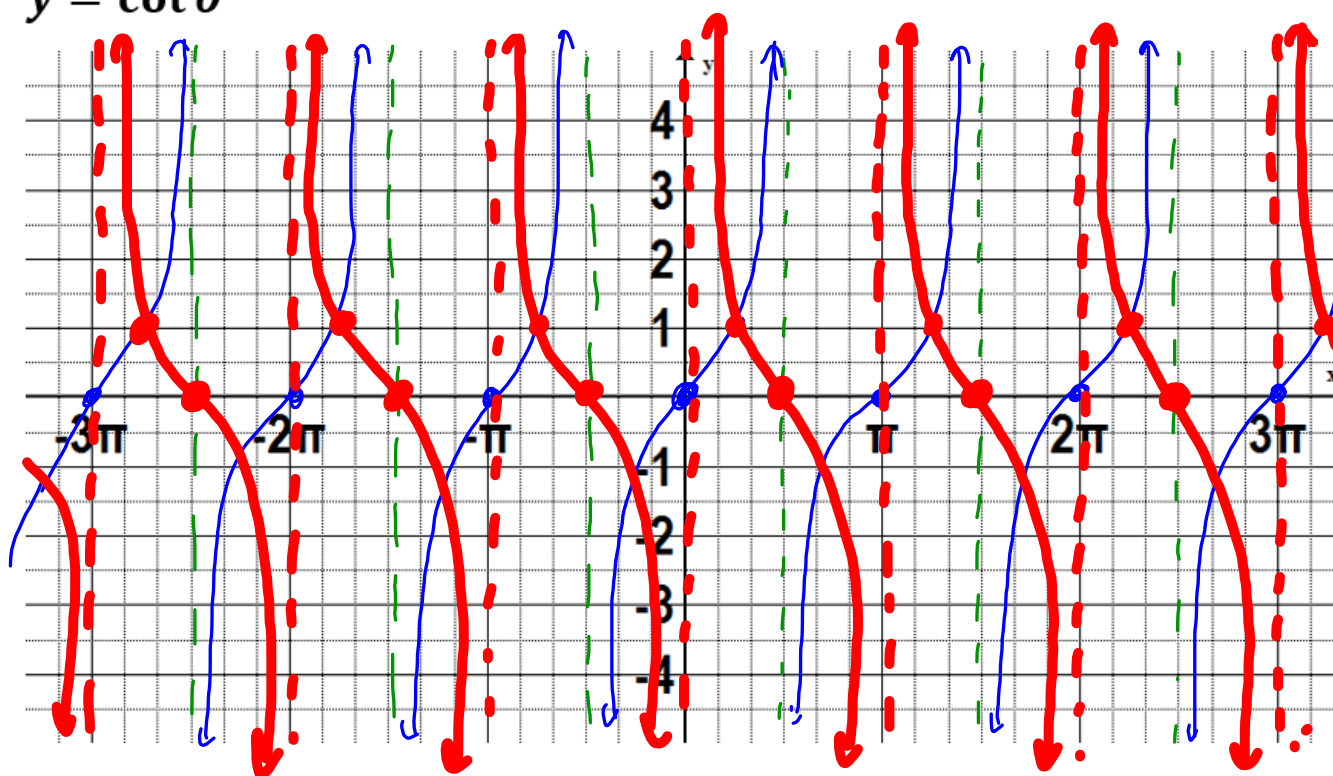


$$y = \sec \theta$$



$\tan \theta = \frac{\sin \theta}{\cos \theta}$, $\tan \theta = 0$ when $\sin \theta = 0$
 $\tan \theta$ is undefined (asymptote) when $\cos \theta = 0$

$\tan \theta = 1$ when $\sin \theta = \cos \theta$
 $y = \cot \theta$



	Period	Amplitude	Asymptotes	y-intercept	θ -intercepts
$\csc \theta$	2π	undefined	$0, \pi, 2\pi, \dots$	none	none
$\sec \theta$	2π	undefined	$\frac{\pi}{2}, \frac{3\pi}{2}, \dots$	$y = 1$	none
$\cot \theta$	π	undefined	$0, \pi, 2\pi, 3\pi, \dots$	none	$\frac{\pi}{2}, \frac{3\pi}{2}, \dots$

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