Graphs of Other Trigonometric Functions

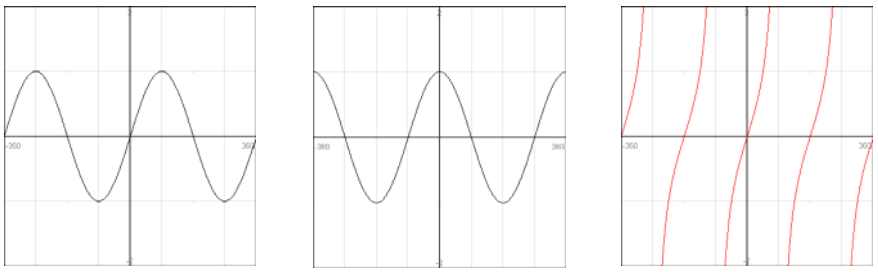
$y = \tan x$

$\tan x = \dfrac{\sin x}{\cos x}$

$\tan x = 0$ when $\sin x = 0$

$\tan x = \textit{undefined}$ when $\cos x = 0$

$y = \sin x$ $y = \cos x$ $y = \tan x$



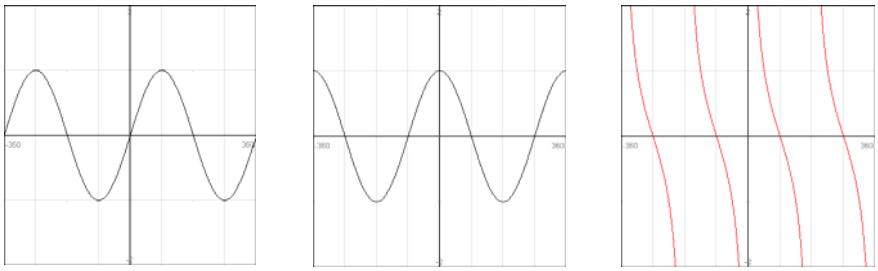
$y = \cot x$

$\cot x = \dfrac{\cos x}{\sin x}$

$\cot x = 0$ when $\cos x = 0$

$\cot x = \textit{undefined}$ when $\sin x = 0$

$y = \sin x$ $y = \cos x$ $y = \cot x$



$y = a \tan bx$

$y = a \cot bx$

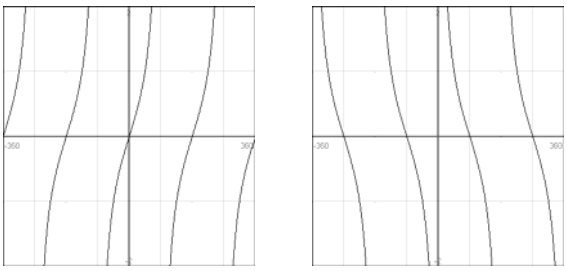
b = frequency - the number of cycles in π radians

$\dfrac{\pi}{b}$ = period - how long it takes to complete one cycle

<u>Transformations of the Tangent and Cotangent Functions</u>

$a > 0$

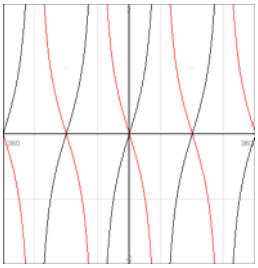
$y = \tan x$ $y = \cot x$



$y = \tan x$ $y = \cot x$

$y = -\tan x$ $y = -\cot x$

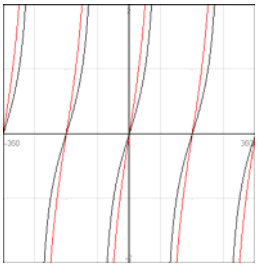
$a < 0$



$|a| > 1$

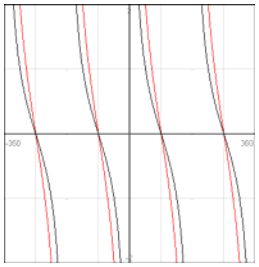
$y = \tan x$

$y = 2\tan x$



$y = \cot x$

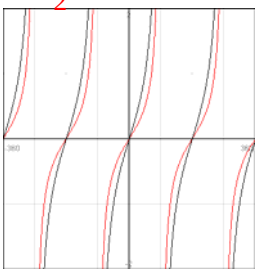
$y = 2\cot x$



$0 < |a| < 1$

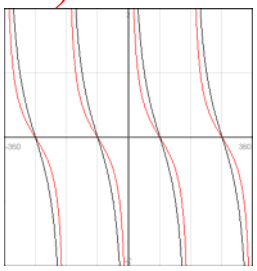
$y = \tan x$

$y = \frac{1}{2}\tan x$



$y = \cot x$

$y = \frac{1}{2}\cot x$



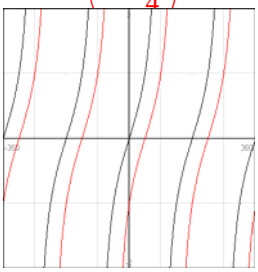
$y = \tan(x - h)$

$y = \cot(x - h)$

Shift graph h units to the right

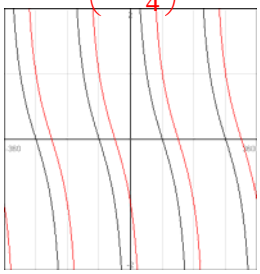
$y = \tan x$

$y = \tan\left(x - \frac{\pi}{4}\right)$



$y = \cot x$

$y = \cot\left(x - \frac{\pi}{4}\right)$



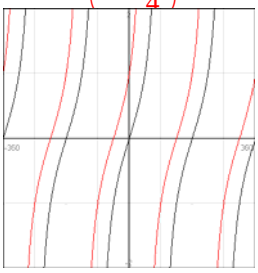
$y = \tan\left(x + h\right)$

$y = \cot\left(x + h\right)$

Shift graph h units to the left

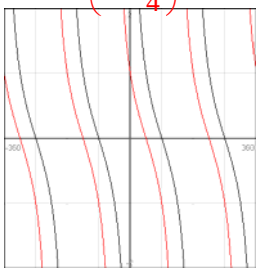
$y = \tan x$

$y = \tan\left(x + \frac{\pi}{4}\right)$



$y = \cot x$

$y = \cot\left(x + \frac{\pi}{4}\right)$



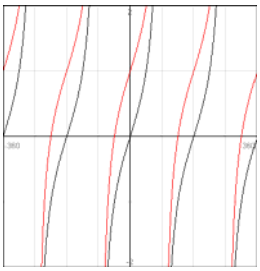
$y = \tan x + k$

$y = \cot x + k$

Shift graph k units up

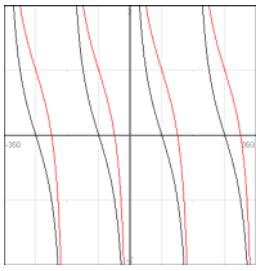
$y = \tan x$

$y = \tan x + 1$



$y = \cot x$

$y = \cot x + 1$



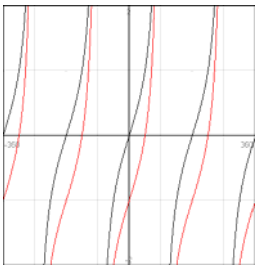
$y = \tan x - k$

$y = \cot x - k$

Shift graph k units down

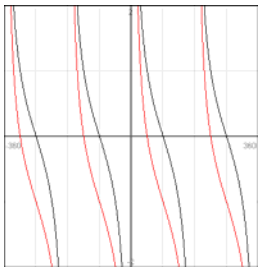
$y = \tan x$

$y = \tan x - 1$



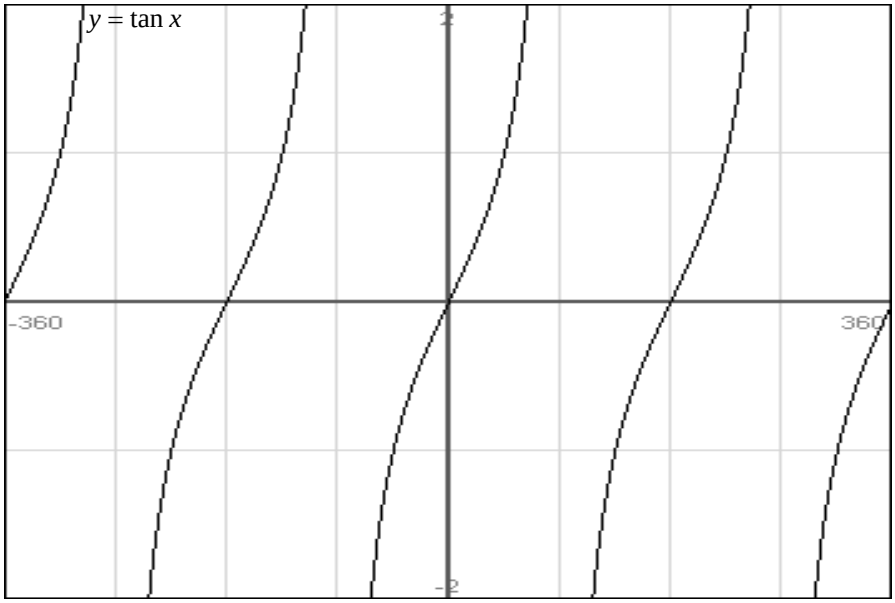
$y = \cot x$

$y = \cot x - 1$

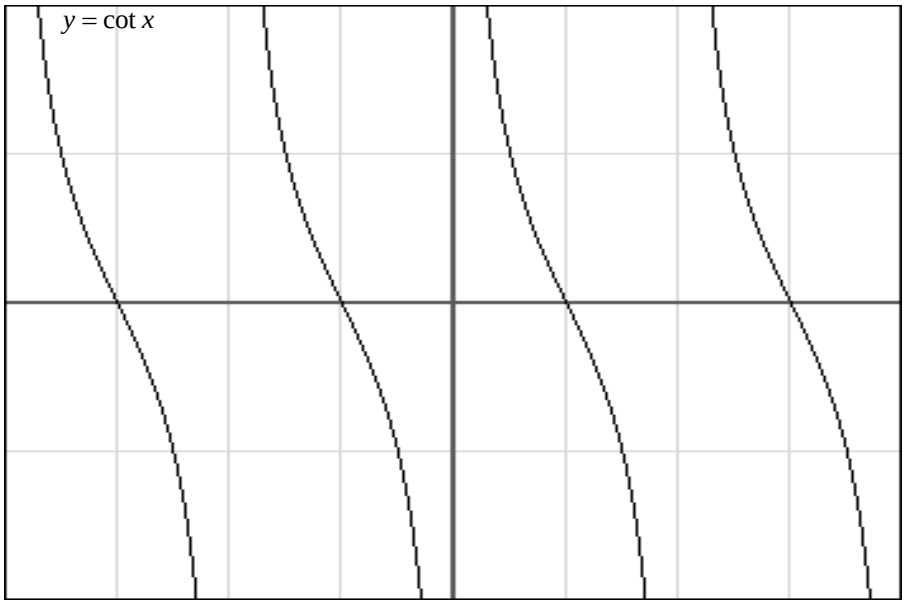


Directions: Sketch the graph of each function in the interval $[0, 2\pi]$.

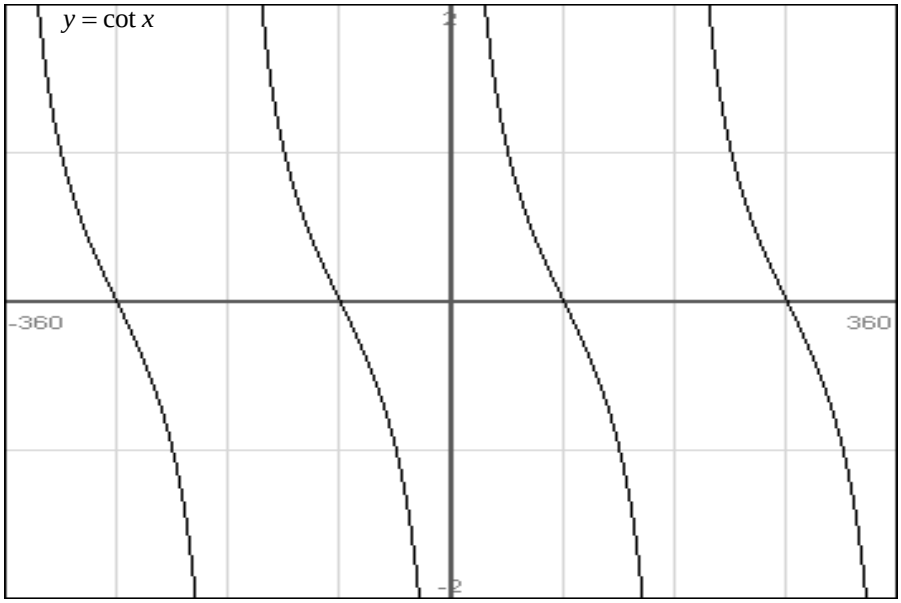
1. $y = \tan 4x$



2. $y = \cot\frac{\pi x}{2}$



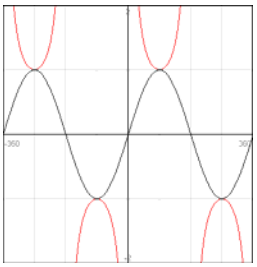
3. $y = \frac{1}{3}\cot x$



$y = \csc x$

$\csc x = \dfrac{1}{\sin x}$

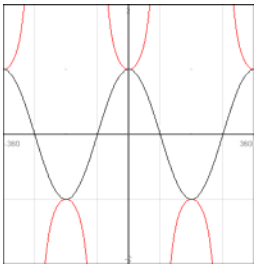
$\csc x = \textit{undefined}$ when $\sin x = 0$



$y = \sec x$

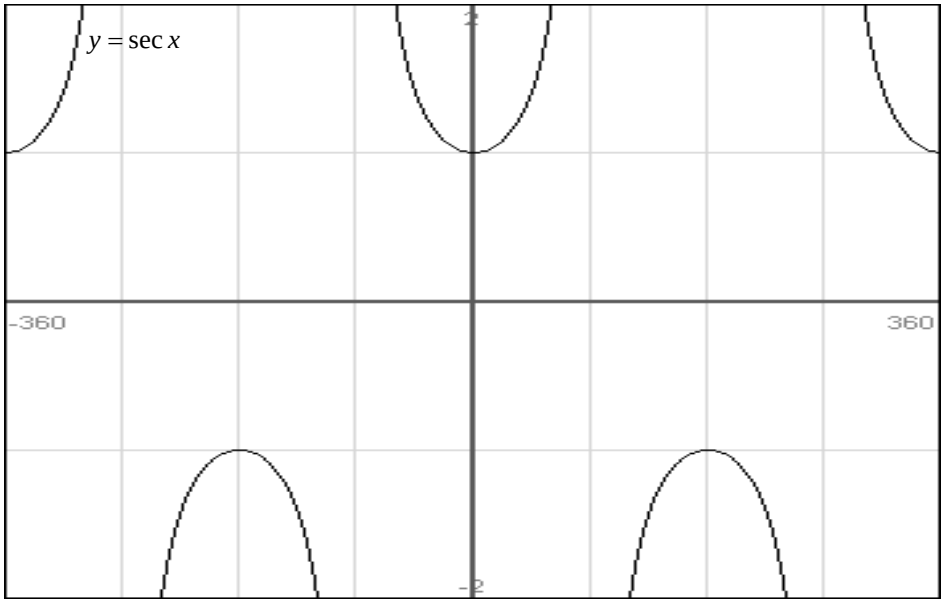
$\sec x = \dfrac{1}{\cos x}$

$\sec x = \textit{undefined}$ when $\cos x = 0$



Directions: Sketch the graph of each function in the interval $[0, 2\pi]$.

4. $y = \dfrac{1}{2}\sec 4x$



5. $y = \csc\left(x - \frac{\pi}{2}\right)$