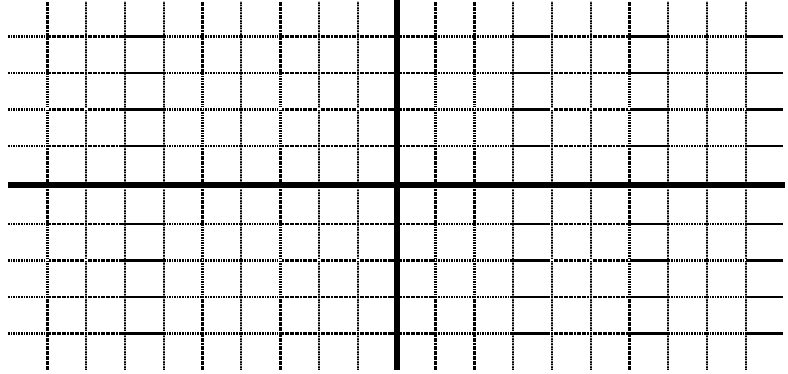


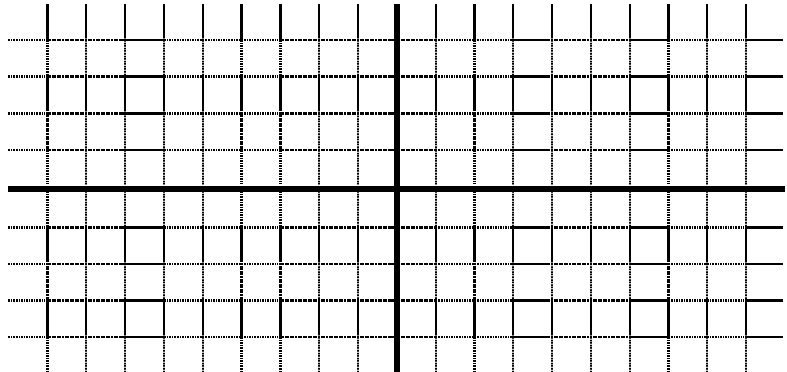
**Notes—4.7 Graphing Tangent, Cotangent, Secant, Cosecant Functions**

On each of the grids below the sine and cosine functions are graphed. Use the values of  $y = \sin x$  and  $y = \cos x$  to determine the values of each of the following...hints are provided.

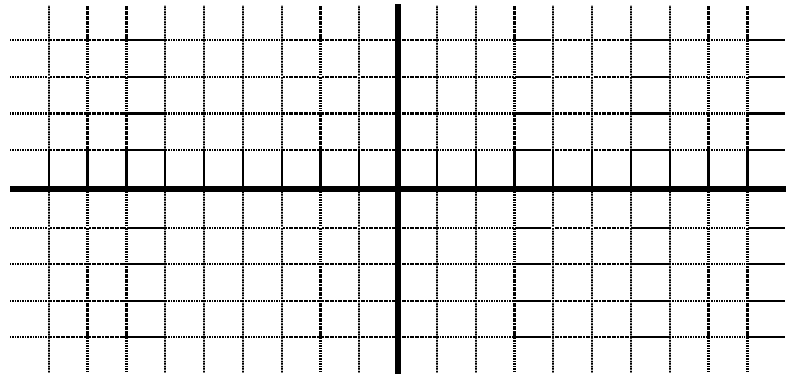
1)  $y = \tan x$



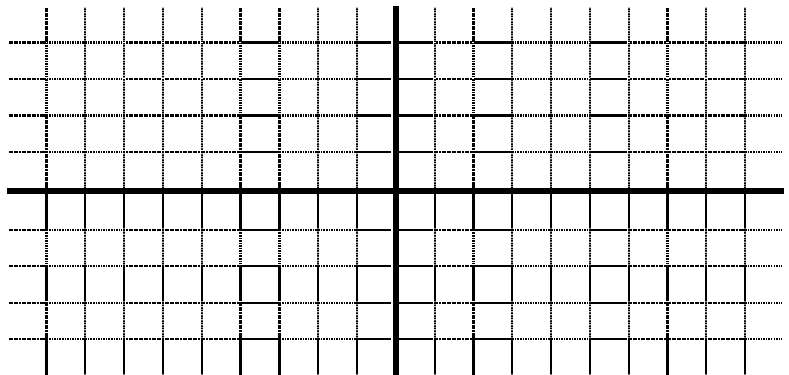
2)  $y = \cot x$



3)  $y = \sec x$

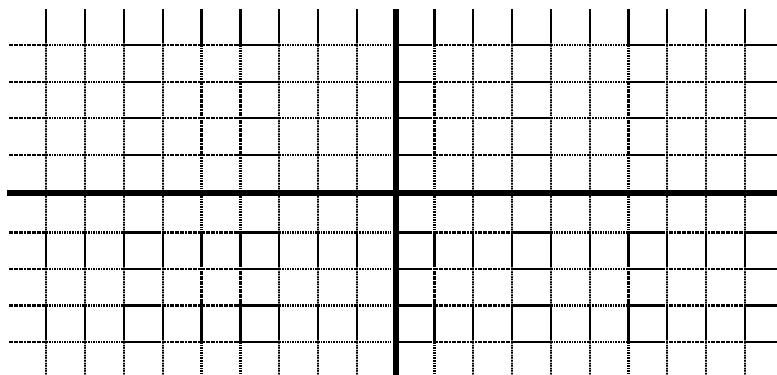


4)  $y = \csc x$



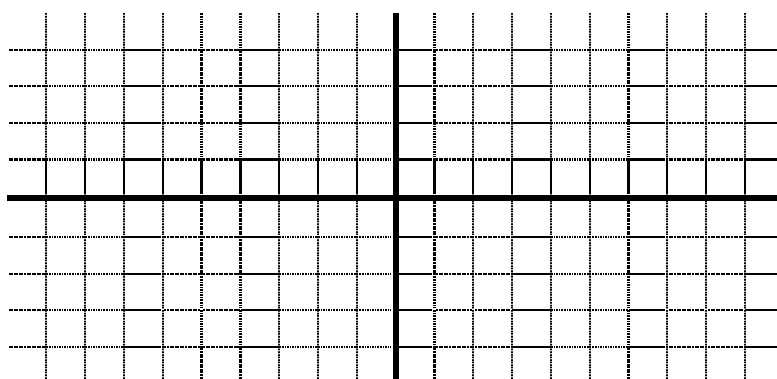
### EXAMPLE 1 Graphing a Tangent Function

Describe the graph of the function  $y = -\tan 2x$  in terms of a basic trigonometric function. Locate the vertical asymptotes and graph four periods of the function.



### EXAMPLE 2 Graphing a Cotangent Function

Describe the graph of  $f(x) = 3 \cot(x/2) + 1$  in terms of a basic trigonometric function. Locate the vertical asymptotes and graph two periods.



### EXAMPLE 3 Solving a Trigonometric Equation Algebraically

Find the value of  $x$  between  $\pi$  and  $3\pi/2$  that solves  $\sec x = -2$ .

#### Summary: Basic Trigonometric Functions

Function	Period	Domain	Range	Asymptotes	Zeros	Even/Odd
$\sin x$	$2\pi$	All reals	$[-1, 1]$	None	$n\pi$	Odd
$\cos x$	$2\pi$	All reals	$[-1, 1]$	None	$\pi/2 + n\pi$	Even
$\tan x$	$\pi$	$x \neq \pi/2 + n\pi$	All reals	$x = \pi/2 + n\pi$	$n\pi$	Odd
$\cot x$	$\pi$	$x \neq n\pi$	All reals	$x = n\pi$	$\pi/2 + n\pi$	Odd
$\sec x$	$2\pi$	$x \neq \pi/2 + n\pi$	$(-\infty, -1] \cup [1, \infty)$	$x = \pi/2 + n\pi$	None	Even
$\csc x$	$2\pi$	$x \neq n\pi$	$(-\infty, -1] \cup [1, \infty)$	$x = n\pi$	None	Odd