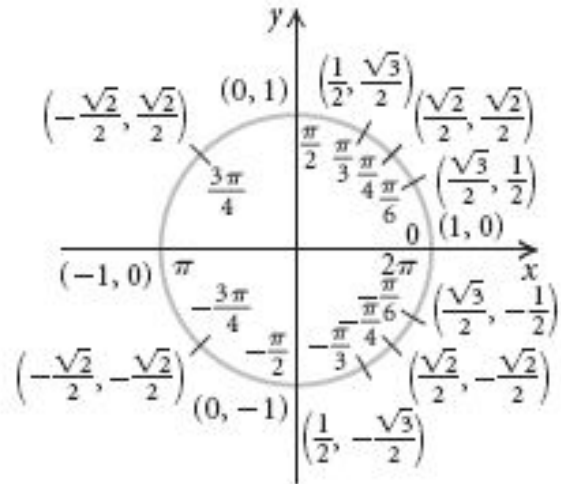


5.6 Graphs of Tangent, Cotangent, Secant, and Cosecant Functions

Recall the values of tangent and cotangent at special angles:

x	$y = \tan x$	x	$y = \cot x$
$-\frac{\pi}{3}$	$-\sqrt{3} \approx -1.7$	$\frac{\pi}{6}$	$\sqrt{3} \approx 1.7$
$-\frac{\pi}{4}$	-1	$\frac{\pi}{4}$	1
$-\frac{\pi}{6}$	$-\frac{\sqrt{3}}{3} \approx -0.6$	$\frac{\pi}{3}$	$\frac{\sqrt{3}}{3} \approx 0.6$
0	0	$\frac{\pi}{2}$	0
$\frac{\pi}{6}$	$\frac{\sqrt{3}}{3} \approx 0.6$	$\frac{2\pi}{3}$	$-\frac{\sqrt{3}}{3} \approx -0.6$
$\frac{\pi}{4}$	1	$\frac{3\pi}{4}$	-1
$\frac{\pi}{3}$	$\sqrt{3} \approx 1.7$	$\frac{5\pi}{6}$	$-\sqrt{3} \approx -1.7$



Tangent Function:

basic properties:

Domain:

Range:

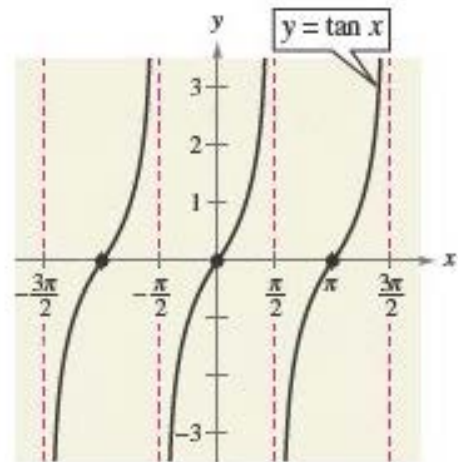
Period:

Symmetry:

y-intercept:

x-intercepts:

Vertical Asymptotes:



Cotangent Function:

basic properties:

Domain:

Range:

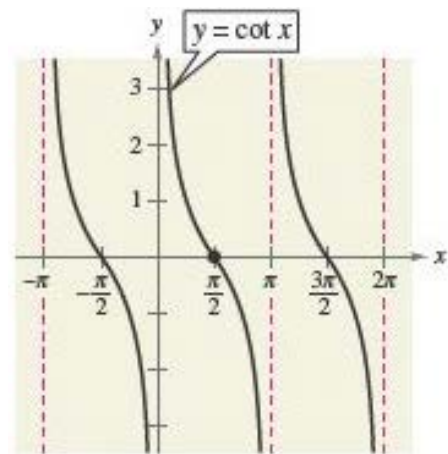
Period:

Symmetry:

y-intercept:

x-intercepts:

Vertical Asymptotes:



Secant Function:

basic properties:

Domain:

Range:

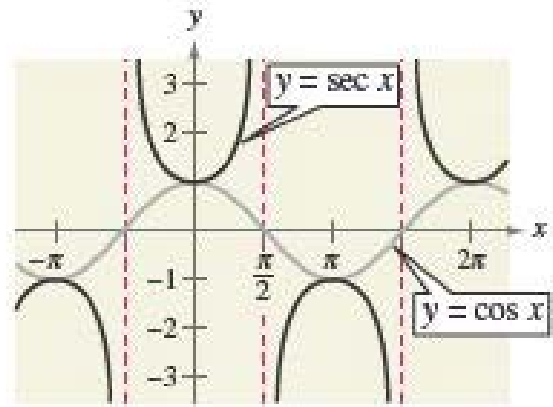
Period:

Symmetry:

y-intercept:

x-intercepts:

Vertical Asymptotes:



Cosecant Function:

basic properties:

Domain:

Range:

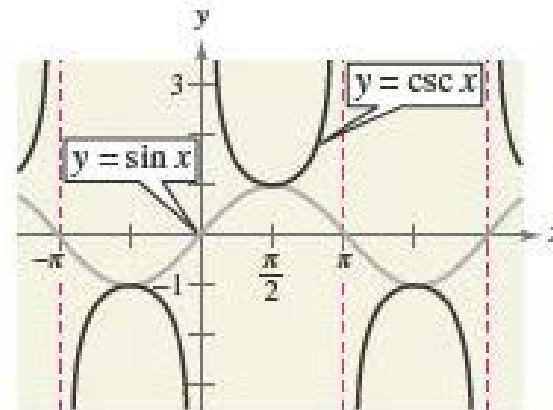
Period:

Symmetry:

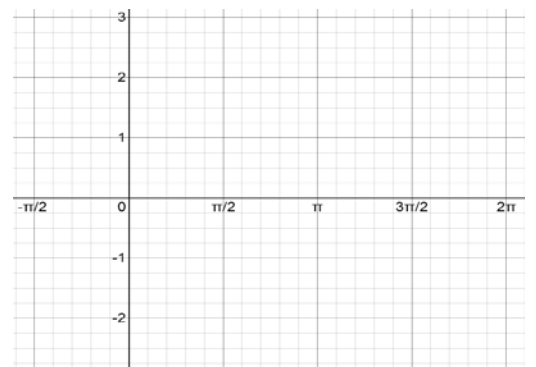
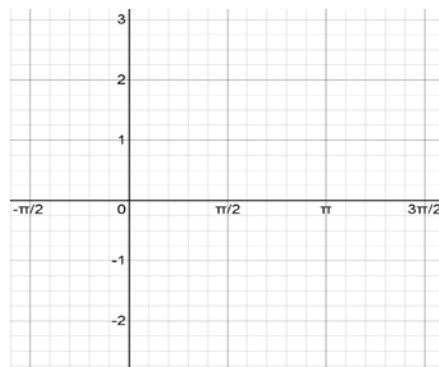
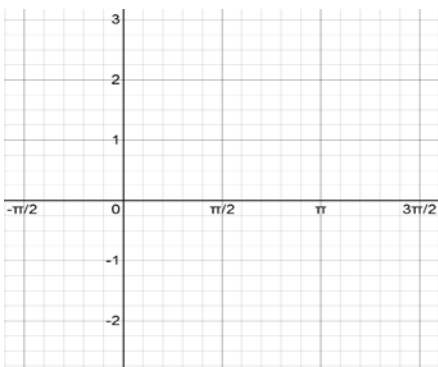
y-intercept:

x-intercepts:

Vertical Asymptotes:



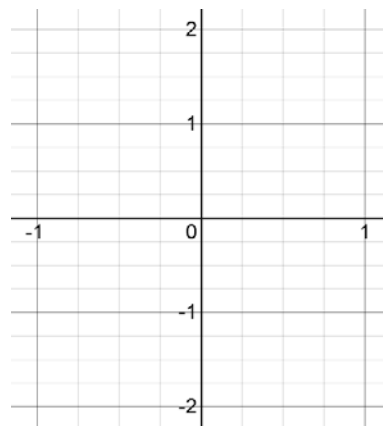
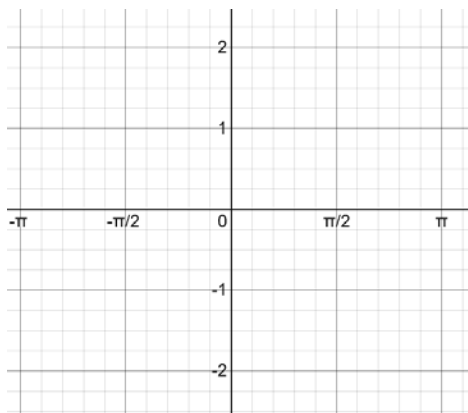
Example 1: Graph $f(x) = \frac{1}{2} \tan x$, $g(x) = -\cot x$, and $h(x) = 2 \csc x$.



The period of $f(x) = \tan Bx$ or $f(x) = \cot Bx$, for any $B \in \mathbb{R} \setminus \{0\}$ can be found by the rule:

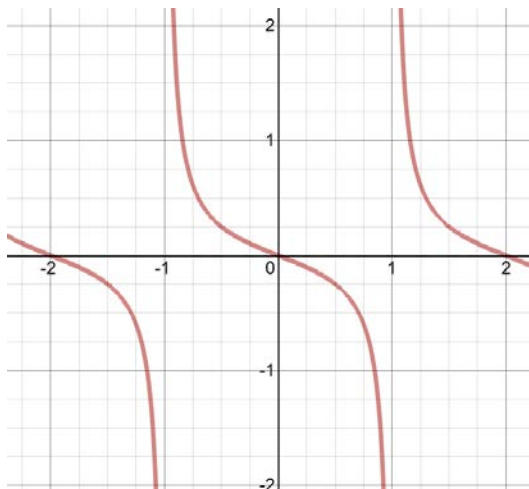
$$\text{Period} = \frac{\pi}{|B|}$$

Example 2: Give the period and graph $f(x) = \frac{1}{2} \tan\left(\frac{1}{2}x\right)$, and $g(x) = \frac{1}{4} \cot \pi x$.

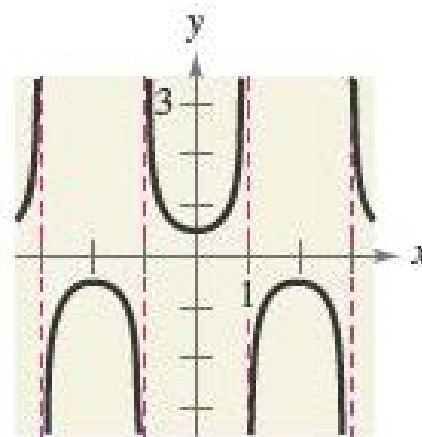


Example 3: Find a formula for the function given by the graph.

a)



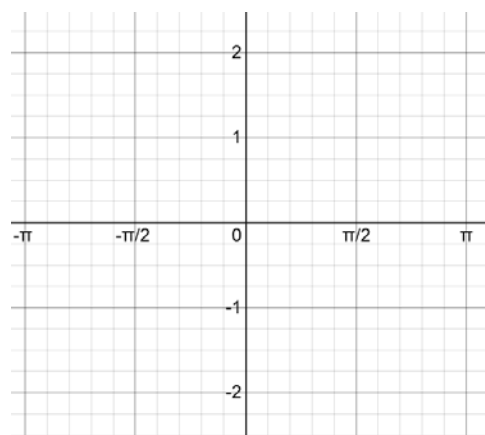
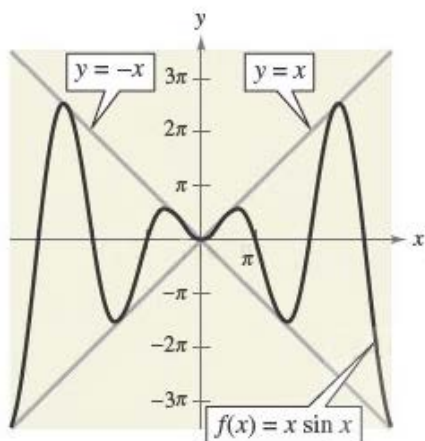
b)



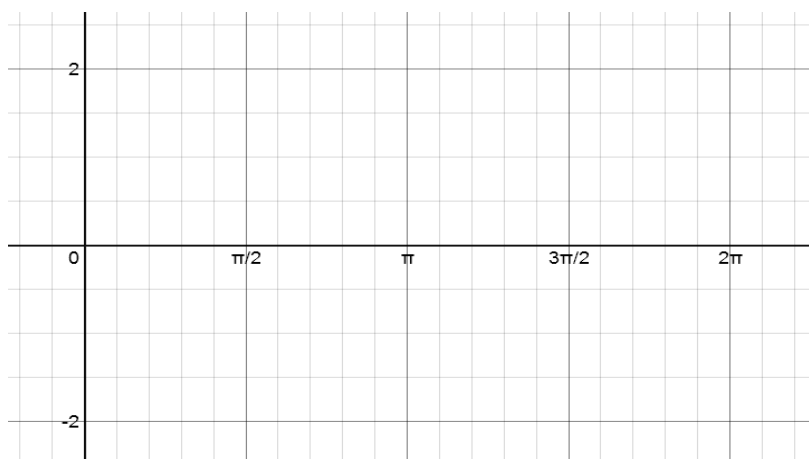
Example 6: Graph.

a) $f(x) = x \sin x$

b) $g(x) = \tan|x|$



c) $h(x) = |\sec x|$



d) $p(x) = x^2 \cos x$

