

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.

parent $y = \tan x$

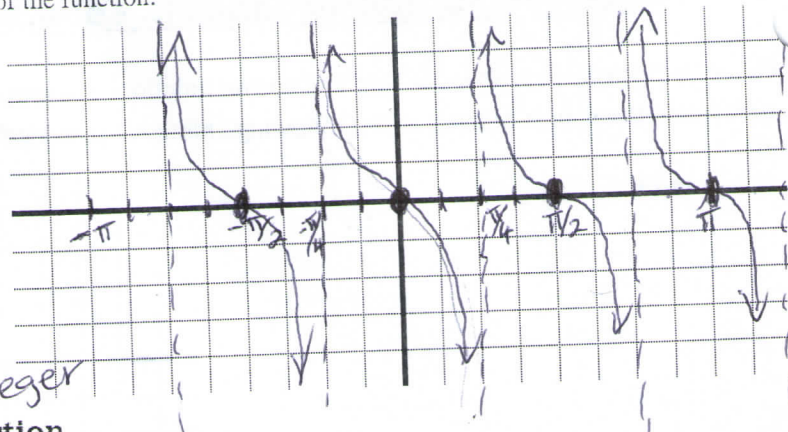
horiz. shrink $\times \frac{1}{2}$

refl over x-axis

$$\text{per} = \frac{\pi}{2}$$

V.o. when $x = n \cdot \frac{\pi}{4}$

n is an odd integer



EXAMPLE 2 Graphing a Cotangent Function

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

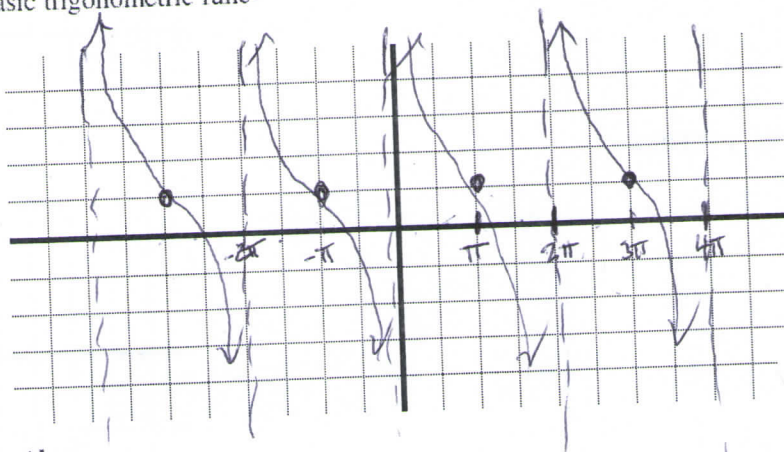
parent $y = \cot x$

horiz. stretch $\times 2$

vert. stretch $\times 3$

up 1

$$\text{per} = \frac{\pi}{\frac{1}{2}} = 2\pi$$

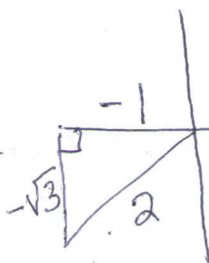


EXAMPLE 3 Solving a Trigonometric Equation Algebraically

Find the value of x between π and $3\pi/2$ that solves $\sec x = -\frac{2}{1} \frac{1}{\cos x}$

quad 3

$$\cos x = -\frac{1}{2}$$



$$m^2 + (-1)^2 = 2^2$$

$$m^2 = 3$$

$$m = -\sqrt{3}$$

$$\frac{4\pi}{3}$$

Summary: Basic Trigonometric Functions

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