Graphing Sine and Cosine

$y = a \sin(bx - c) + d$

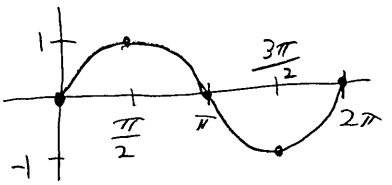
amplitude $= |a|$

period $= \frac{2\pi}{b}$

phase shift $= \frac{c}{b}$

vertical translation $= d$

$y = \sin x$



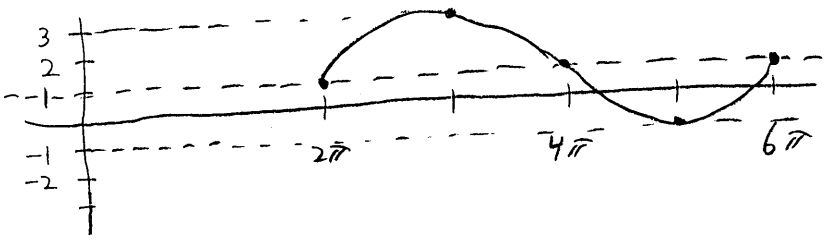
example: $y = 2 \sin\left(\frac{1}{2}x - \pi\right) + 1$

amplitude $= 2$

period $= 4\pi$

phase shift $= 2\pi$

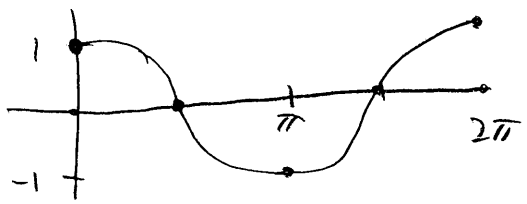
vert. transl. $= 1$



$y = a \cos(bx - c) + d$

same as the sine

$y = \cos x$



Graphing Tangent and Cotangent

$y = a\tan(bx - c) + d$

a = height of point halfway between center and asymptote (vertical stretch)

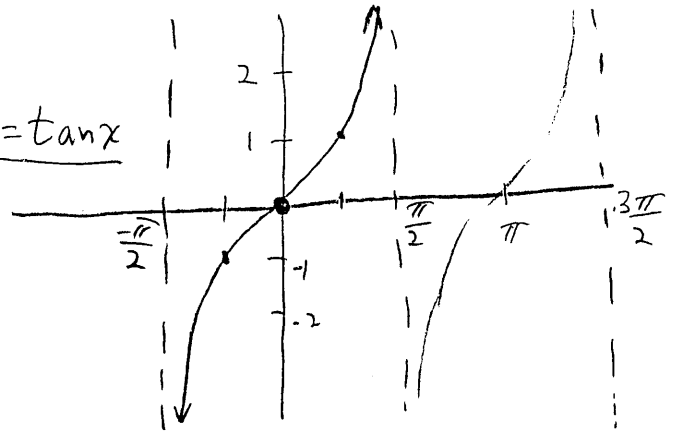
$\text{period} = \frac{\pi}{b}$

phase shift = c

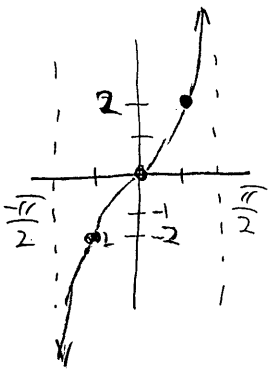
vertical shift = d

if a is negative, reflect across x-axis

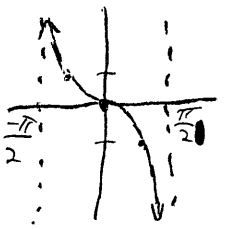
$y = \tan x$



$y = 2\tan x$

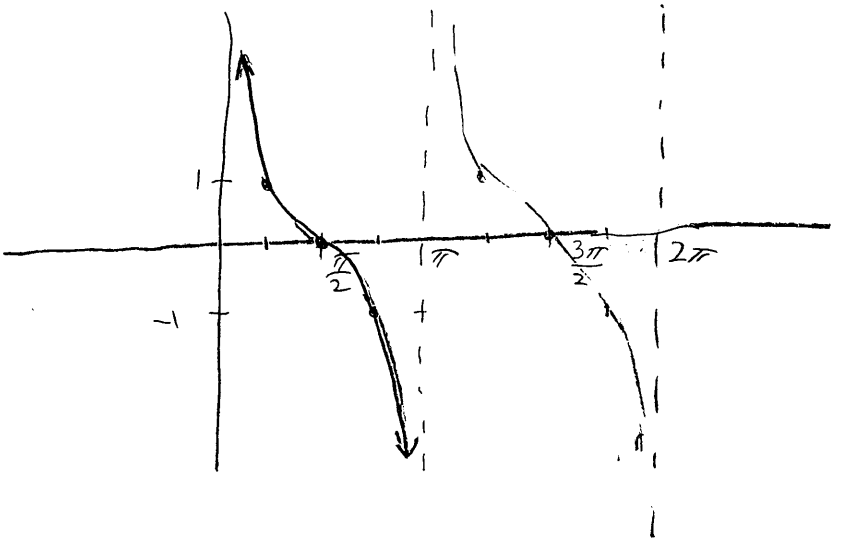


$y = -\tan x$



$y = a\cot(bx - c) + d$ Same as tangent

$y = \cot x$



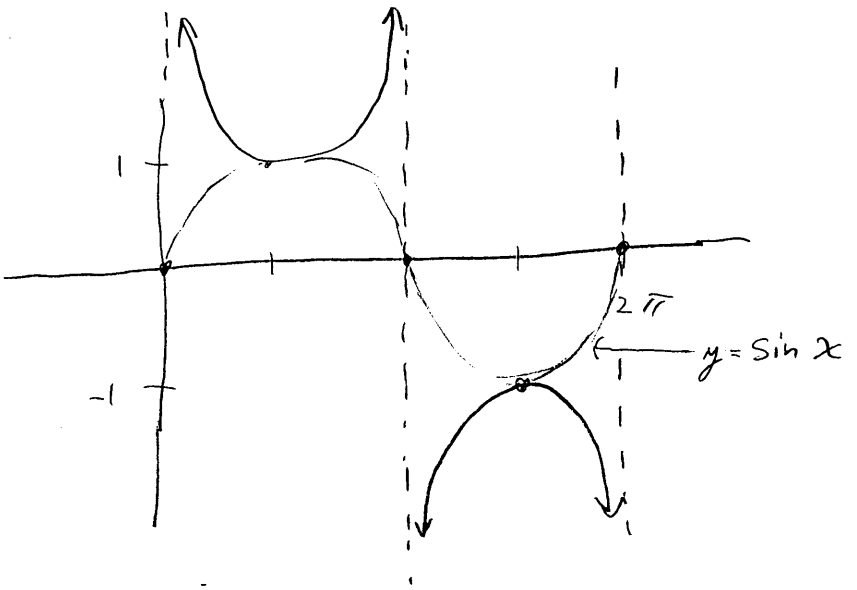
Graphing Cosecant and Secant

$y = a \csc(bx - c) + d$

First graph the sin function.

Then draw in the cosecant function as shown.

$y = \csc x$



$y = a \sec(bx - c) + d$

First graph the cosine function.

Then draw in the secant function as shown.

$y = \sec x$