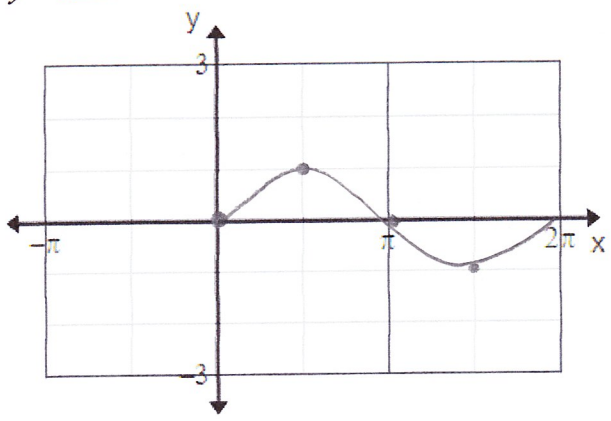
Pre-Calculus Notes
Tangent and Cotangent

Name: Key

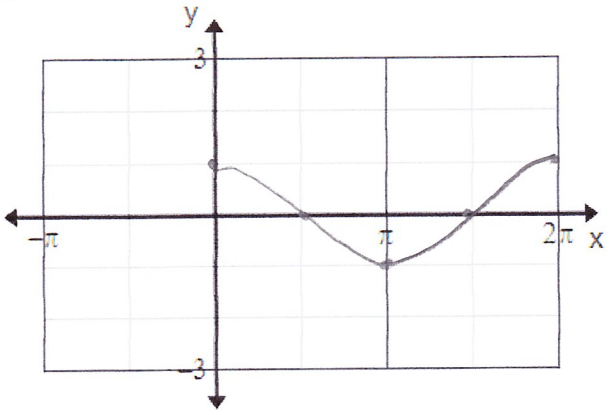
Period: ____

RECALL...

$y = \sin x$



$y = \cos x$



Well... $\tan x = \dfrac{\sin x}{\cos x}$ ... REMEMBER?

Let's graph $y = \tan x$ over the interval $[-\pi, 2\pi]$.

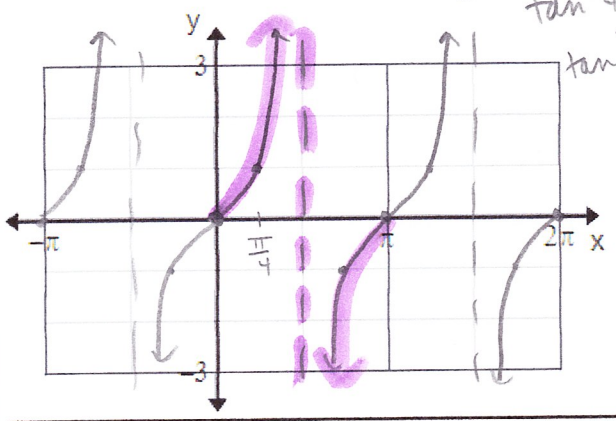
0 - MAX - 0 - MIN - 0

MAX - 0 - MIN - 0 - MAX

0 - U - 0 - U - 0

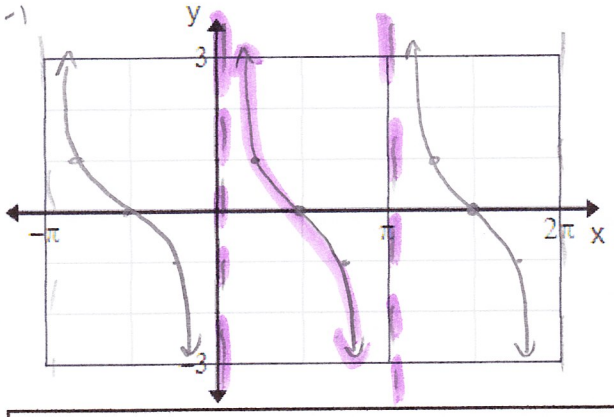
$\tan \frac{\pi}{4} = 1$

$\tan \frac{3\pi}{4} = -1$



Now let's look at $y = \cot x$ over the interval $[-\pi, 2\pi]$.

REMEMBER... $\cot x = \dfrac{1}{\tan x}$ OR $\cot x = \dfrac{\cos x}{\sin x}$.



TANGENT GENERALIZATIONS:

Amplitude: none

Domain: ℝ except odd mult $\frac{\pi}{2}$

Range: ℝ

Zeroes: @ mult of π

Asymptotes: @ odd mult $\frac{\pi}{2}$

Even or Odd? odd

COTANGENT GENRALIZATIONS:

Amplitude: none

Domain: ℝ except mult. π

Range: ℝ

Zeroes: @ odd mult $\frac{\pi}{2}$

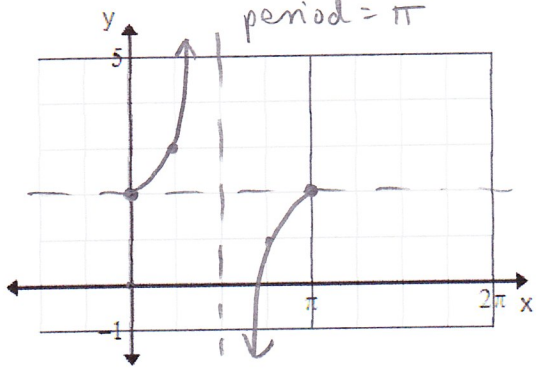
Asymptotes: @ mult π

Even or Odd? odd

Example 1: Graph each function over one period, showing vertical asymptotes.

a. $y = \tan x + 2$

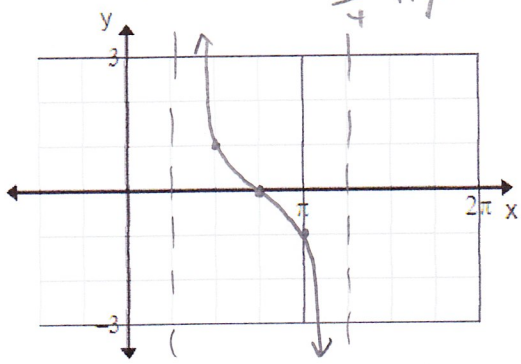
up 2 0-u-0 period = π



b. $y = \cos\left(x - \frac{\pi}{4}\right)$

period = π

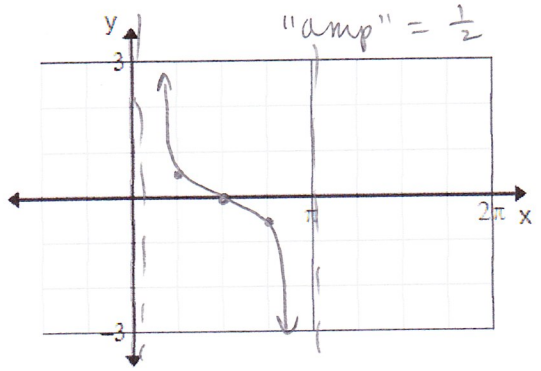
$\frac{\pi}{4}$ right u-o-u



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

u-o-u period = π

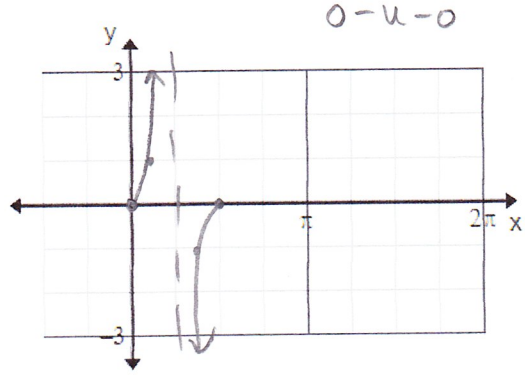
"amp" = $\frac{1}{2}$



d. $y = \tan(2x)$

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

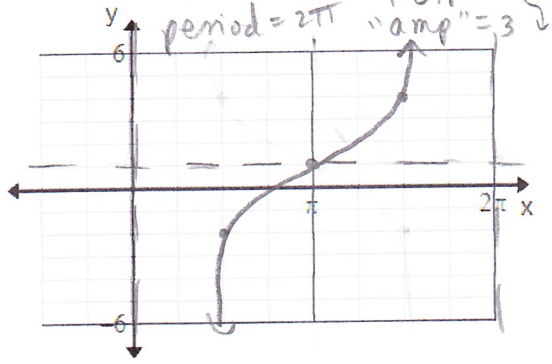
o-u-o



e. $y = -3\tan\left(\frac{1}{2}x\right) + 1$

u-o-u

period = 2π "amp" = 3 FLIP up 1

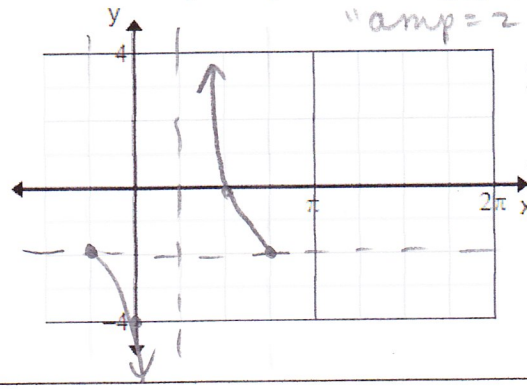


f. $y = -2\tan\left(x + \frac{\pi}{4}\right) - 2$

o-u-o down 2 "amp" = 2 flip

$\frac{\pi}{4}$ left

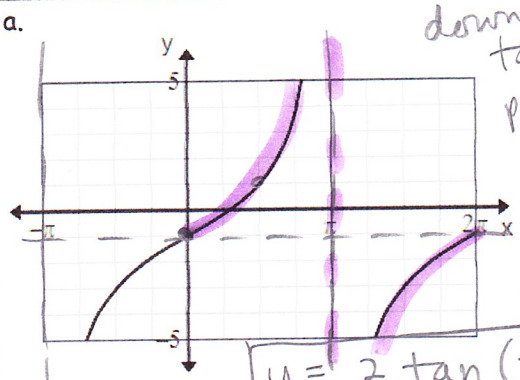
period = π



Example 2: Write the equation of each function.

a.

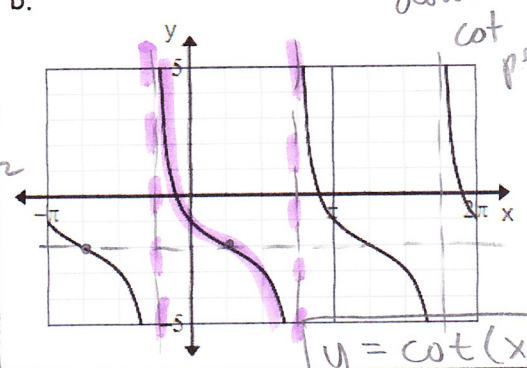
down 1 tangent period = 2π $\frac{\pi}{2\pi} = \frac{1}{2}$ "amp" = 2



$y = 2\tan\left(\frac{1}{2}x\right) - 1$

b.

down 2 cot period = π $\frac{\pi}{4}$ left down 2 "amp" = 1



$y = \cot\left(x + \frac{\pi}{4}\right) - 2$