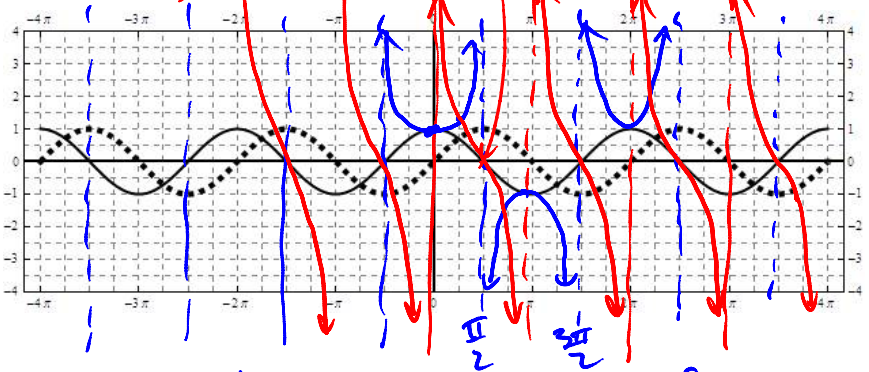
6.4 Graphs and Transformations

Monday, February 02, 2009
10:49 AM

$\cot t = \frac{\cos t}{\sin t}$

$\cot \frac{\pi}{2} = 0$ b/c $\cos \frac{\pi}{2} = 0$



Which is which:

① easy values

② cos x is sin x translated left $\frac{\pi}{2}$

③ increasing/decreasing in QI.

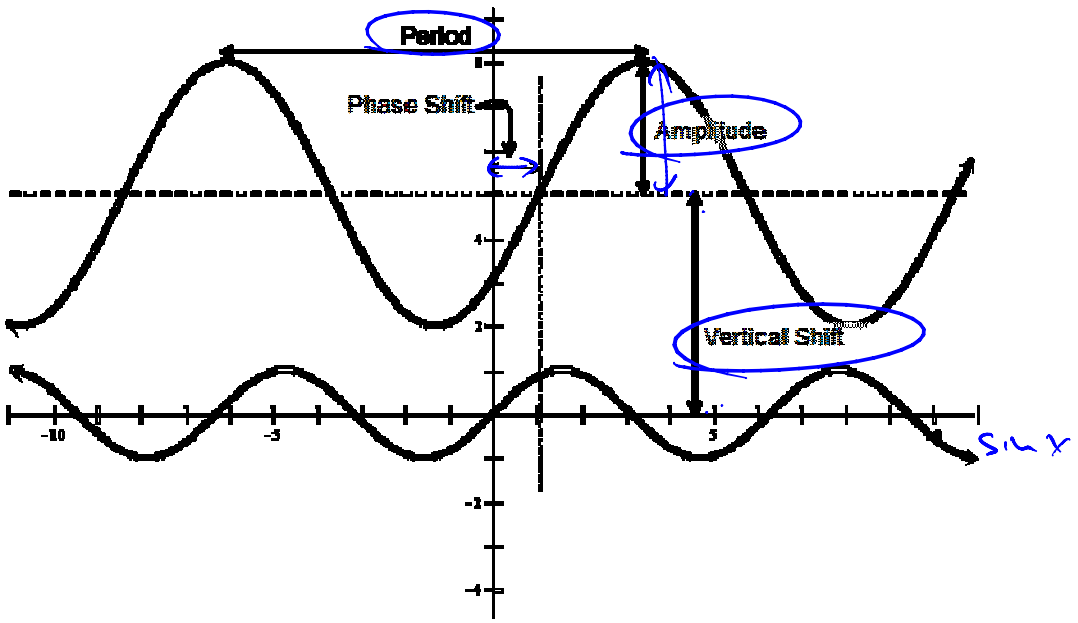
Sec t: Has VAs at zeros of cos t

$\frac{1}{\cos t}$ → when cos t ↑, $\frac{1}{\cos t}$ ↓

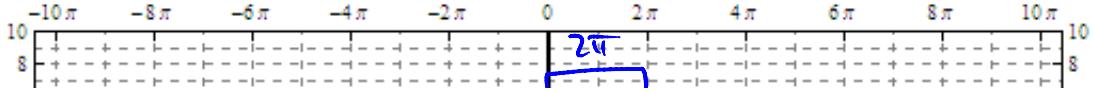
Dom sec t = $\{x \mid x \neq \frac{\pi}{2}, \frac{3\pi}{2}, \frac{5\pi}{2}, \ldots$ or $\frac{(2n+1)\pi}{2}, n \in \mathbb{Z}$ or $\frac{\pi}{2} + \pi \cdot n, n \in \mathbb{Z}\}$

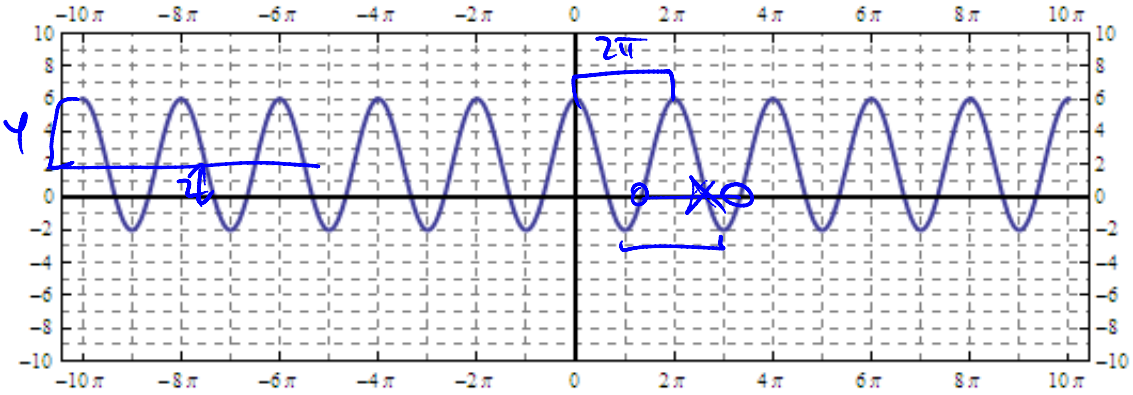
Rng sec t = $\mathbb{R} \setminus (-1, 1)$ or $(-\infty, -1] \cup [1, +\infty)$

Dom cot t = $\{t \mid \sin t \neq 0\} = \{t \mid t \neq 0, \pi, 2\pi, 3\pi, 4\pi, \ldots\}$ $\pi n, n \in \mathbb{Z}$



Period = 2π




−10π
−8π
−6π
−4π
−2π
0
2π
4π
6π
8π
10π
10
8
6
4
2
0
−2
−4
−6
−8
−10
y
2π
2π

HW Discussion

Monday, February 02, 2009
12:58 PM

$(\cot x - \tan x)(\cot^2 x + \overset{\cot x \tan x}{1} + \tan^2 x)$

$= \cot^3 x + \cancel{\cot x} + \cot x \tan^2 x \cancel{\tan x} \quad$ b/c $\cot x = \frac{1}{\tan x}$

$\quad - \cancel{\tan x \cot^2 x} - \cancel{\tan x} - \tan^3 x$

$= \cot^3 x - \tan^3 x$

$\hookrightarrow (a-b)(a^2 + \overset{ab}{1} + b^2) \qquad \cot x \cdot \tan x = 1$

$\tan^4 - \sec^4 x = (\tan^2 x + \sec^2 x)(\tan^2 x - \sec^2 x)$

But $\tan^2 x + 1 = \sec^2 x \Rightarrow \tan^2 x - \sec^2 x = -1$

$\therefore \tan^4 x - \sec^4 x = -1(\tan^2 x + \sec^2 x)$

$2^y - 2^{-y} = 2x \quad$ solve for y

Let $u = 2^y$ then $2^{-y} = \frac{1}{u}$

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

$\Rightarrow u^2 - 1 = 2xu \Rightarrow u^2 - 2xu - 1 = 0$

Quadratic in u

$a=1,\ c=-1,\ b=-2x$

$\therefore u = \frac{2x \pm \sqrt{4x^2+4}}{2} = x \pm \sqrt{x^2+1}$ (factor out $\sqrt{4}$)

$y = \log_2(x \pm \sqrt{x^2+1})$
