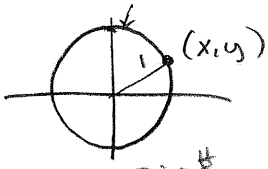
9/26/2012 - Sec 2.4

Math 1060

Sec 2.4 Graphs of tangent and cotangent

Graphing tangent

unit circle



$\tan\theta = \frac{y}{x}$

$\frac{1}{\text{small}} = \text{Big \#}$

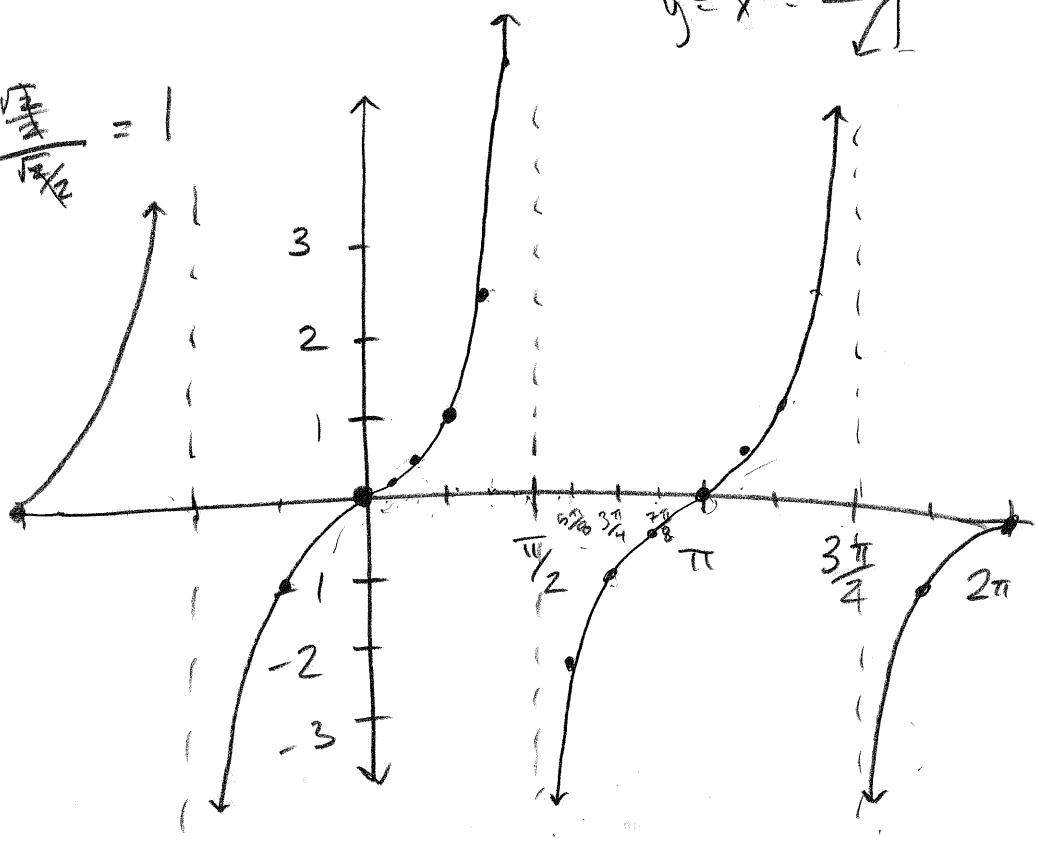
$\tan\theta = \frac{\text{opp}}{\text{adj}}$

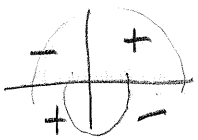
$y = x^3$ =

$y = \tan x$

X	y
0	0
$\pi/4$	1
$\pi/2$	undefined
$3\pi/4$	-1
π	0
$5\pi/4$	1
$3\pi/2$	undefined
$7\pi/4$	-1
2π	0

$\tan\frac{\pi}{4} = \frac{\sqrt{2}/2}{\sqrt{2}/2} = 1$





Period = π

Range : $(-\infty, \infty)$

Passes through zero: multiple of π

Nice: $(0,0)$, $(\frac{\pi}{4}, 1)$, $(-\frac{\pi}{4}, -1)$

Asymptotes: $x = \frac{\pi}{2} + k\pi$ ← Period of tangent

Keypoints for tangent

$x = \frac{-\pi}{2}$, $(\frac{-\pi}{4}, -1)$. $(0,0)$, $(\frac{\pi}{4}, 1)$, $x = \frac{\pi}{2}$

↑ asymptote ↑ asymptote

General Curve

$$y = A \tan[B(x-c)] + D$$

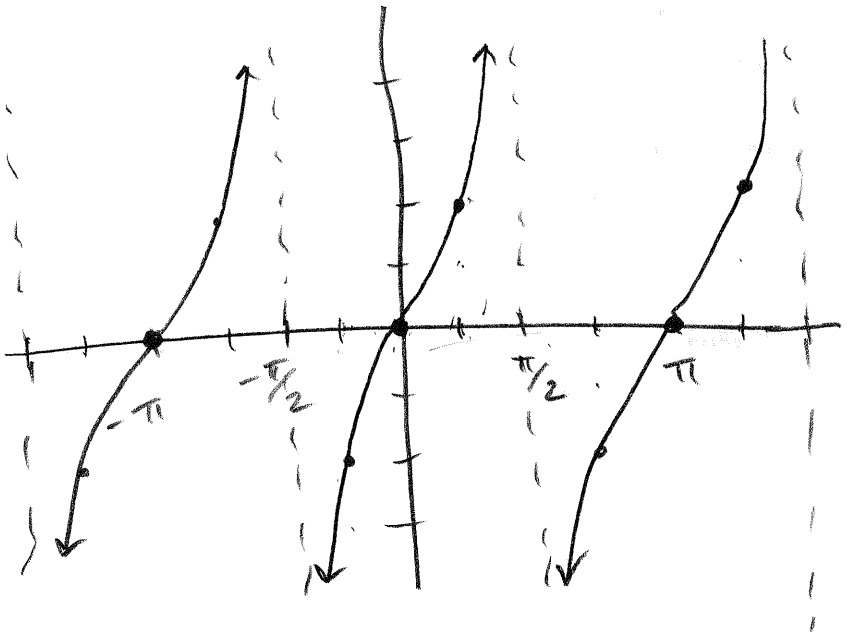
↑ stretch ↑ period calc: $\frac{\pi}{B}$ ↑ x-axis (phase) Shift ↑ Vertical Shift

Graph:

$$y = 2 \tan x$$

- Stretch of 2
- No Shift
- period = π
- Asymptotes

$$x = \frac{\pi}{2} + k\pi$$



$y = \tan(2x)$

Period $= \frac{\pi}{B} = \frac{\pi}{2}$

Before: $x = \frac{\pi}{2} + k\pi$

Now: $x = \frac{\pi}{4} + k \cdot \frac{\pi}{2}$

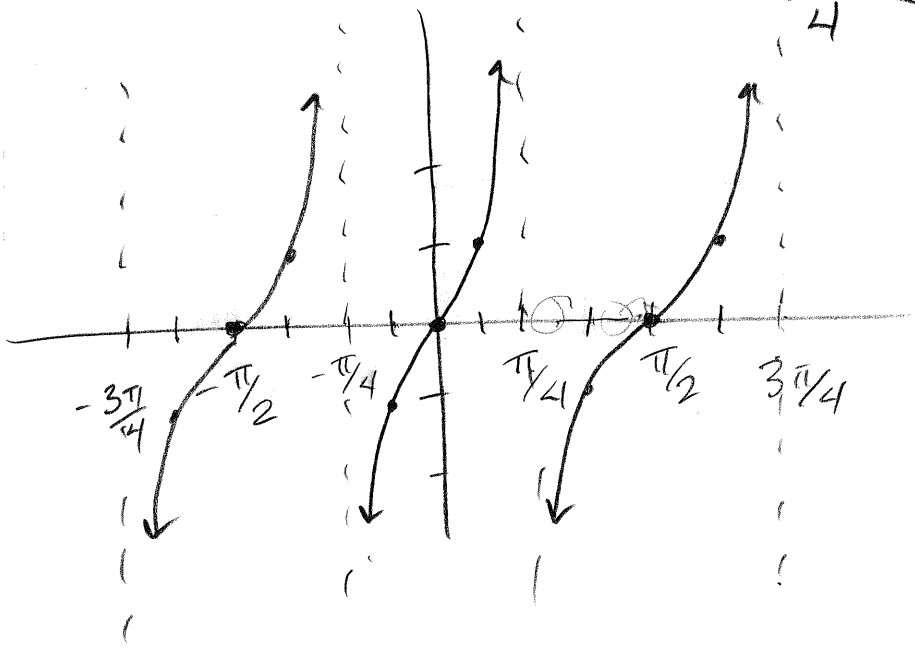
Before

$$-\frac{\pi}{2} < x < \frac{\pi}{2}$$

Now

$$-\frac{\pi}{2} < \frac{2x}{2} < \frac{\pi}{2}/2$$

$$-\frac{\pi}{4} < x < \pi/4$$

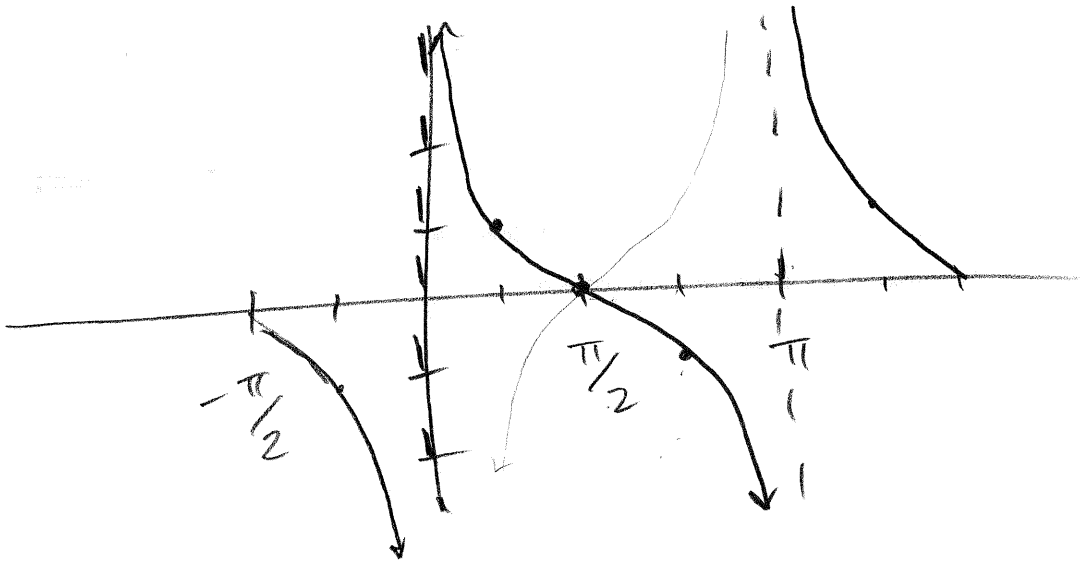


Cotangent:

$y = \cot x$ $\qquad \cot\theta = \frac{1}{\tan\theta}$

Key points at $x = 0, \pi/4, \pi/2, 3\pi/4, \pi$

x	0	$\pi/4$	$\pi/2$	$3\pi/4$	π
$\tan x$	0	1	undefined	-1	0
$\cot x$	undefined	1	0	-1	undefined



Period $= \pi$

Range $= (-\infty, \infty)$

Asymptote: $x = 0 + k\pi$

$x = k\pi$

$y = A \cot[B(x-C)] + D$

A: Stretch

Period: $\frac{\pi}{B}$

C: phase shift

D: Vertical shift

$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta}$

$\cot\theta = \frac{x}{y} = \frac{\cos\theta}{\sin\theta}$ ← for calc