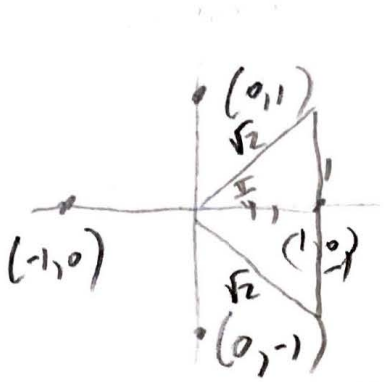
Section 4.6 (Day 2) – Graphs of Tangent & Cotangent Functions

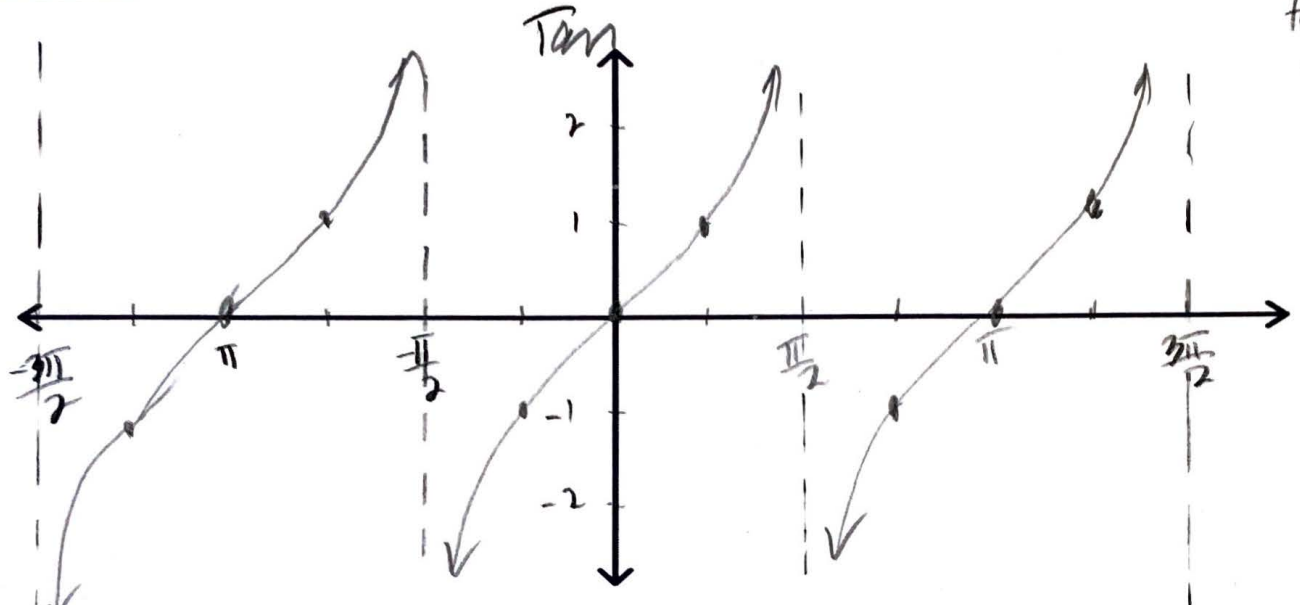
- Where do they come from?? Let's look back at that chart from 4.4:

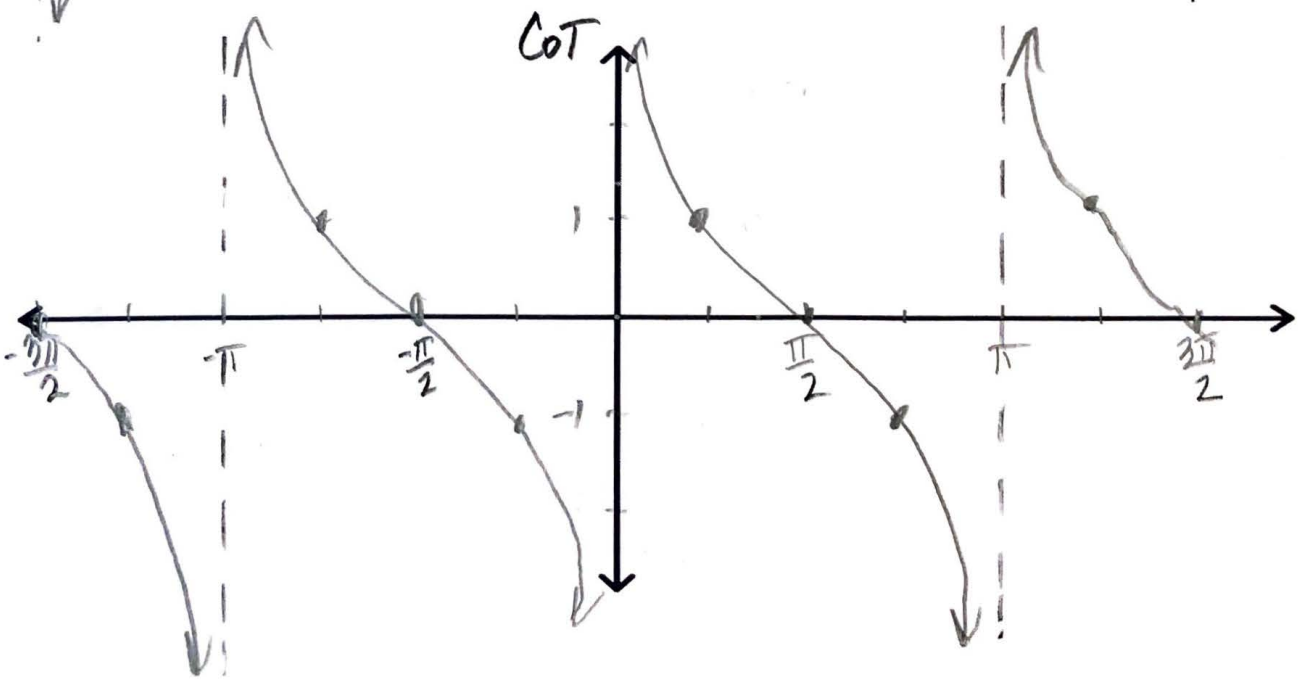
θ	sinθ	cosθ	tanθ	cotθ
0	0	1	0	und
$\pi/2$	1	0	und	0
π	0	−1	0	und
$3\pi/2$	−1	0	und	0



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

$\tan\left(-\frac{\pi}{4}\right) = -1$





Section 4.6 (Day 2) – Graphs of Tangent & Cotangent Functions

How to graph tangent and cotangent

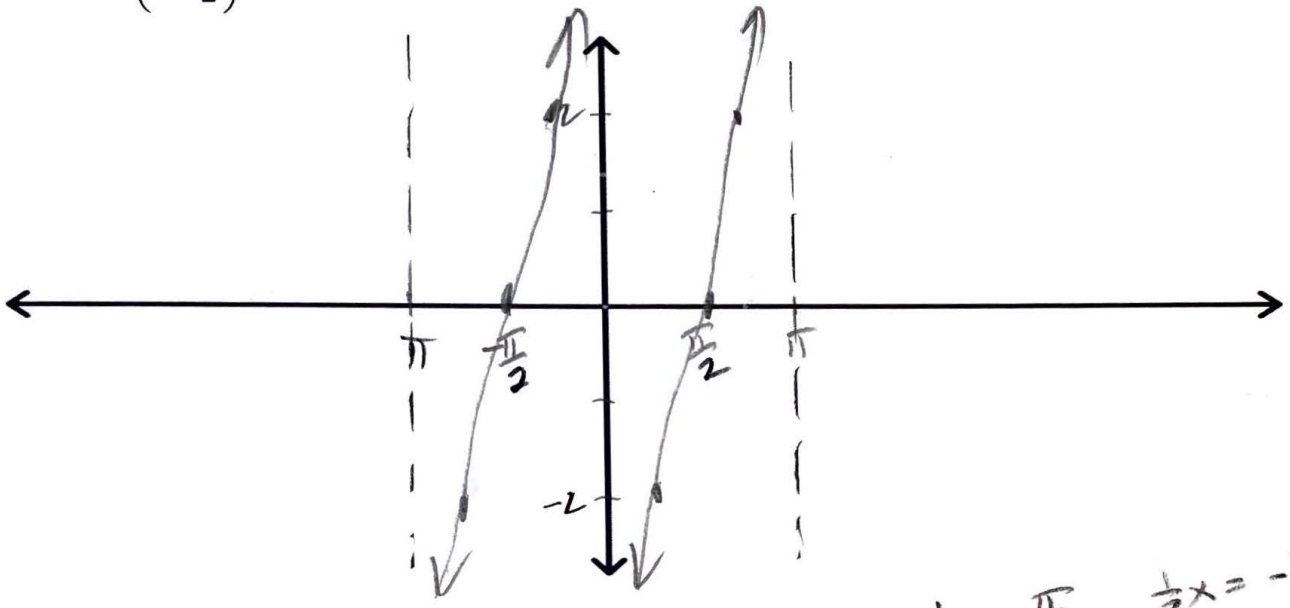
The biggest thing to remember here is that both these functions have π as their default period instead of 2π. So graph the asymptotes first, and then the rest of the function. Essentially you are just graphing a curve like $y = x^3$ a bunch of times.

Examples:

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

$x - \frac{\pi}{2} = \frac{\pi}{2}$ $\quad x - \frac{\pi}{2} = -\frac{\pi}{2}$

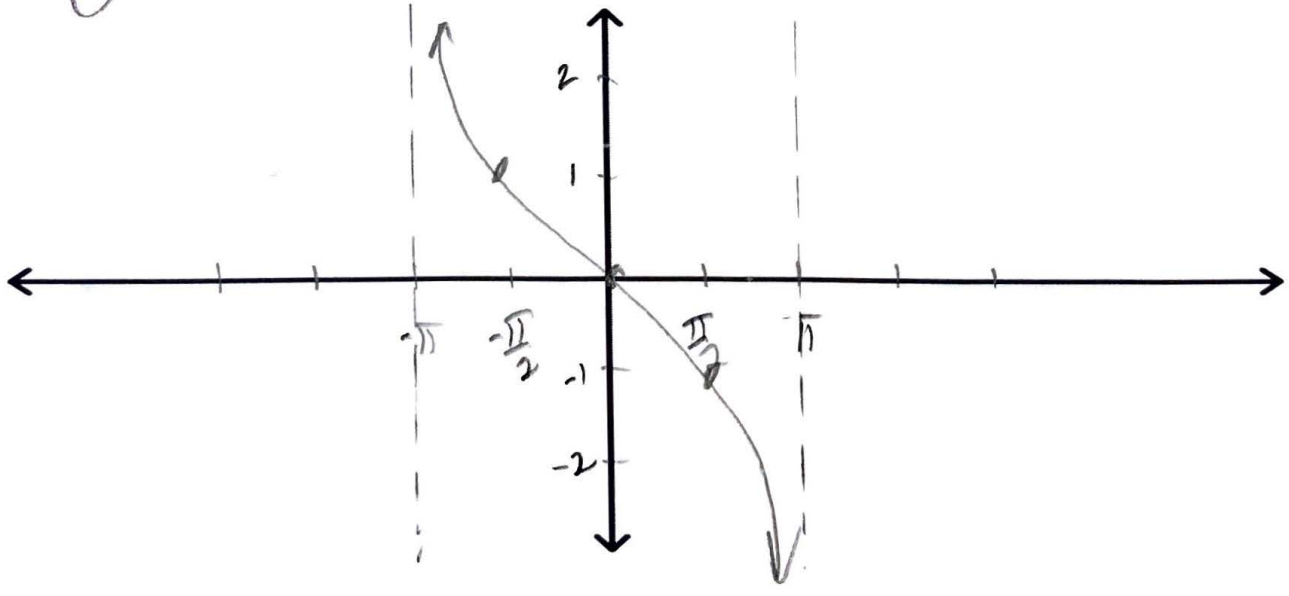
$x = \pi$ $\quad x = 0$



2) $y = -\frac{1}{3}\tan\frac{1}{2}x + 1$

$\frac{1}{2}x = \frac{\pi}{2}$ $\quad x = \pi$

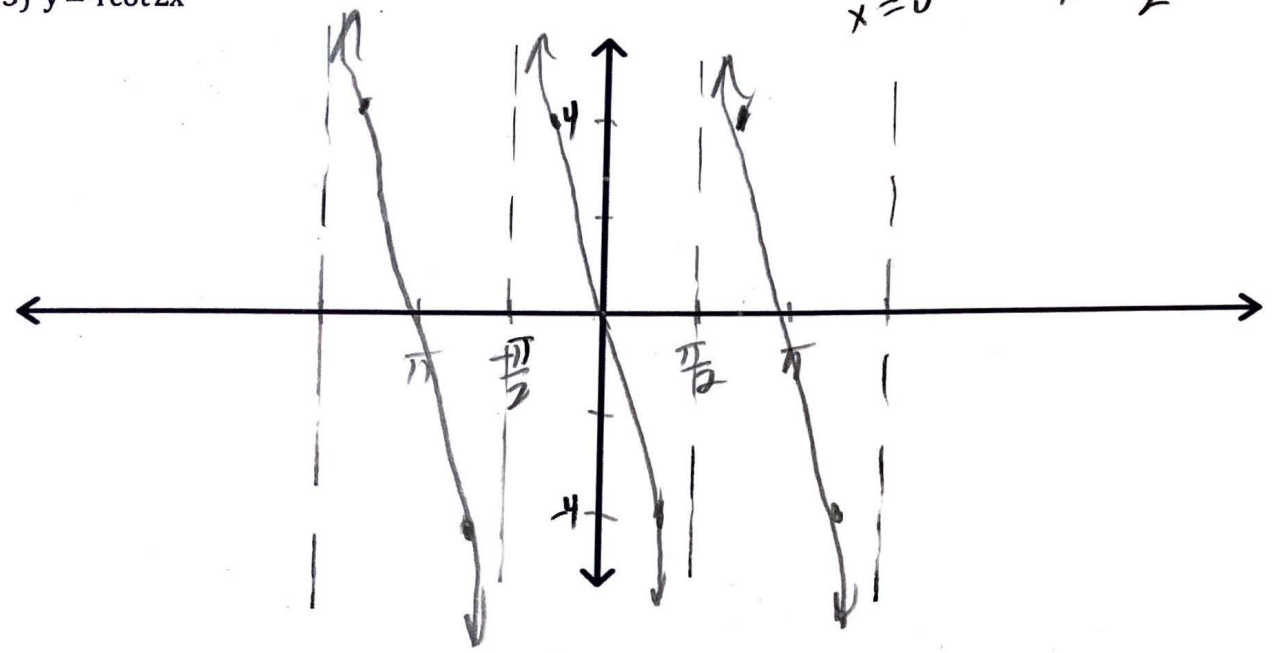
$\frac{1}{2}x = -\frac{\pi}{2}$ $\quad x = -\pi$



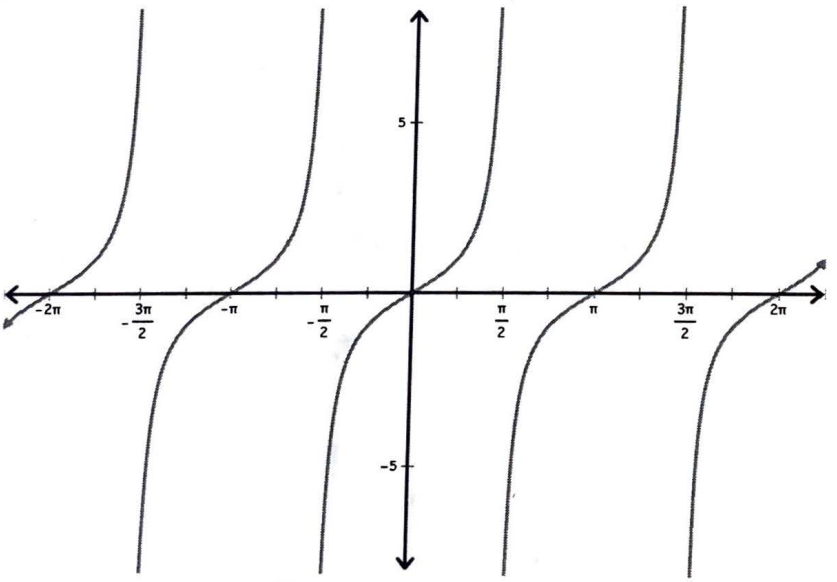
Section 4.6 (Day 2) – Graphs of Tangent & Cotangent Functions

3) $y = 4\cot 2x$

$2x = 0$, $x = 0$; $2x = \pi$, $x = \frac{\pi}{2}$



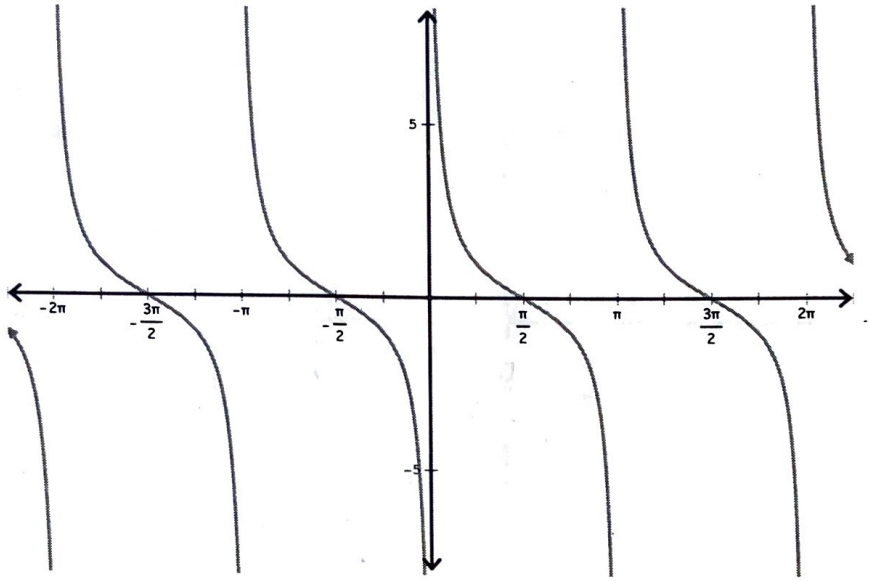
Tangent Curve



- Domain: $\{x \mid x \neq \frac{\pi}{2} + n\pi\}$ Range: $(-\infty, \infty)$ Period: π
- Symmetric with respect to the: *origin* so is and *odd function* $(\tan(-x) = -\tan x)$
- Zeros: $n\pi$ $(-\pi, 0, \pi, \ldots)$
- Max: ∞ Min: $-\infty$

Section 4.6 (Day 2) – Graphs of Tangent & Cotangent Functions

Cotangent Curve



- Domain: all $x \neq n\pi$ Range: $(-\infty, \infty)$ Period: π
- Symmetric with respect to the: *origin* so is and *odd function* $(\cot(-x) = -\cot x)$
- Zeros: $-\frac{\pi}{2}, \frac{\pi}{2}, \ldots$
- Max: ∞ Min: $-\infty$

Homework: p. 339, #7, 9, 19, 22, 24, 30