Toufiqul Hoque
MATH 2312
Pre-Calculus II
Mr. Aguirre

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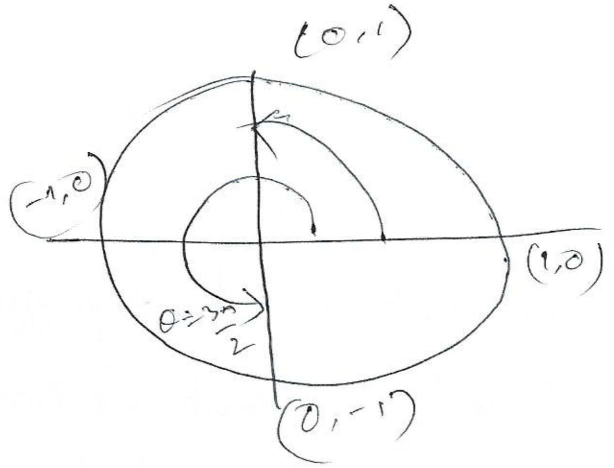
Graphs of tangent, cotangent, secant, cosecant

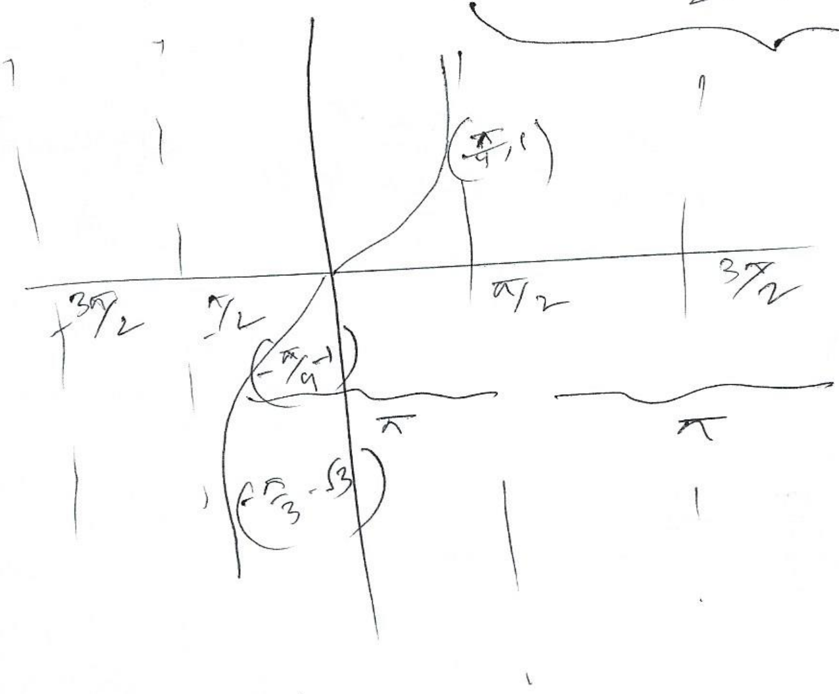
$T = \pi$ length of arc cycle.

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

$\tan \theta = y/x$.



Domain: $\mathbb{R}$, $\underbrace{x \neq \ldots -\frac{3\pi}{2}, -\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}}_{\text{asymptotes}}$



Range: $\mathbb{R}$

$\tan x$

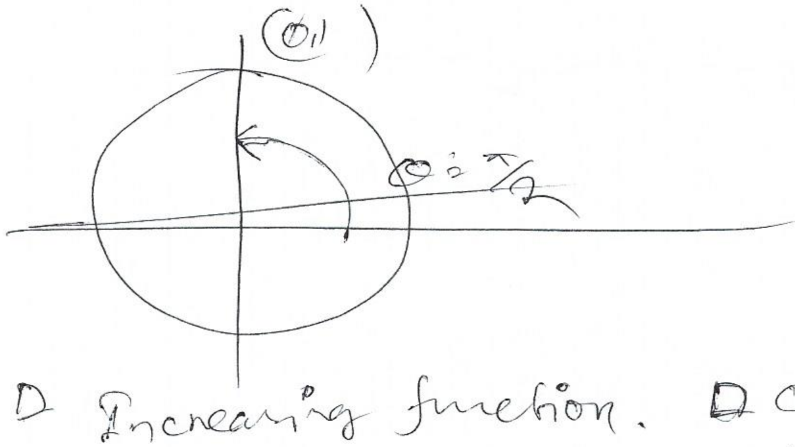
x	$f(x)$
0	0
$\pi/4$	1
$\pi/3$	$\sqrt{3}$
$-\pi/4$	-1
$\pi/3$	$-\sqrt{3}$

We cannot describe the behaviour of tangent at values where undefined instead, we look at the function value very close to these x-values.

$x \to \pi/2$

x approaches $\pi/2$ $\quad \dfrac{\sin x}{\cos x} = \dfrac{\text{close to } 1}{\text{close to } 0}$ approaches to ∞.

$x < \pi/2$



1) Increasing function. 2) Odd function

$\tan(-x) = -\tan x$.

$y = A\tan(wx) + B$ → vertical translation

A → vertical stretch

(wx) ↳ $T = \frac{\pi}{w}$

ex: $y = 2\tan x - 1$ → down 1

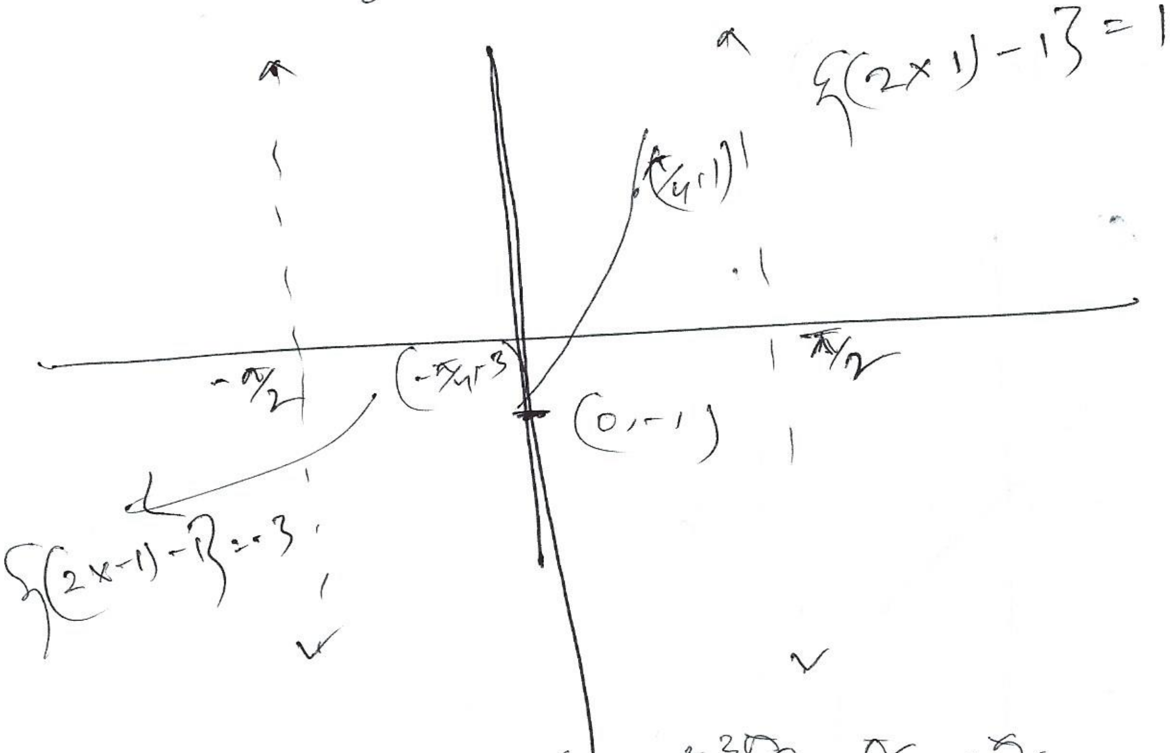
↳ $w = 1$, $T = \pi$

no change in asymptote

vertical stretch by 2

1st change y-coordinate by × 2

2nd chang y-coordinate ~~by~~ ~~subtra~~ (-1)

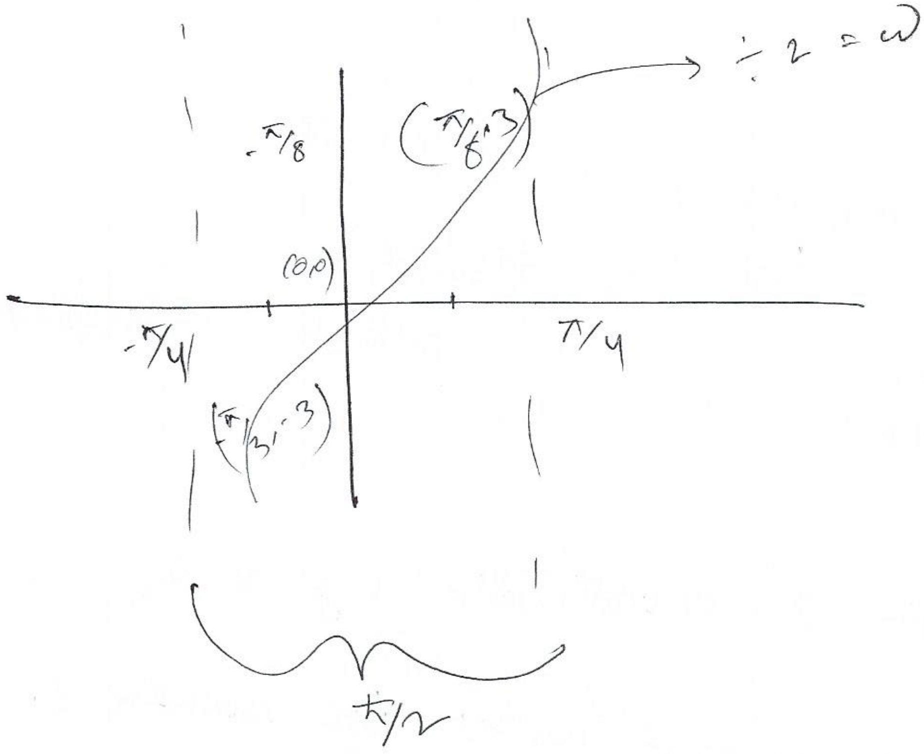


D: $\mathbb{R}$, $x \neq -\frac{3\pi}{2}, -\frac{\pi}{2}, \frac{\pi}{2}$

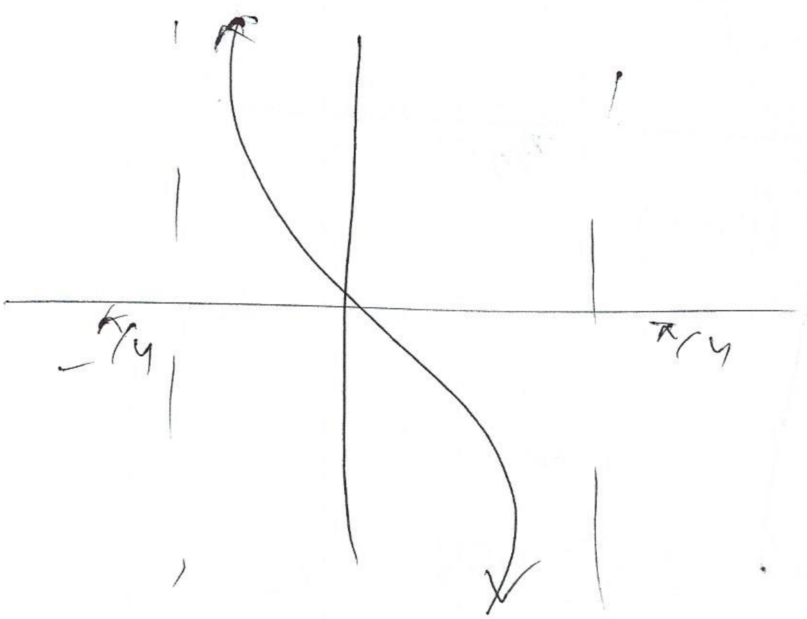
R: $\mathbb{R}$.

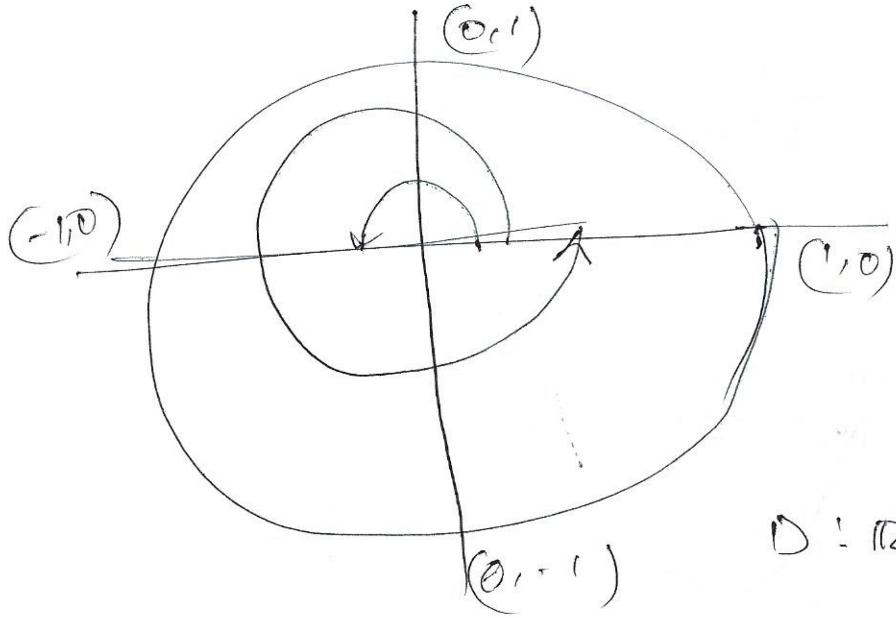
$y = 3\tan(2x)$

$T = \frac{\pi}{\omega} = \frac{\pi}{2}$



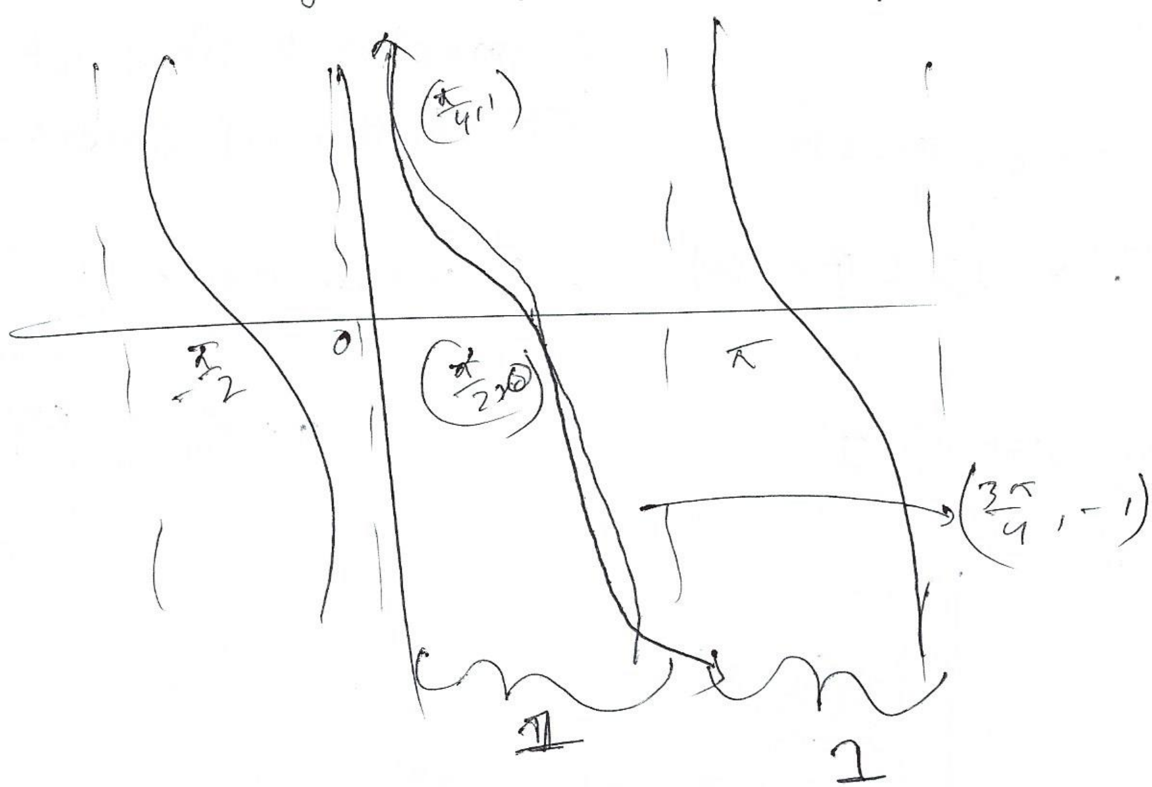
$y = -3\tan(2x)$





$D: \mathbb{R}\ x, x \neq 0, \pi, 2\pi$ — asymptotes

Cotangent is decreasing



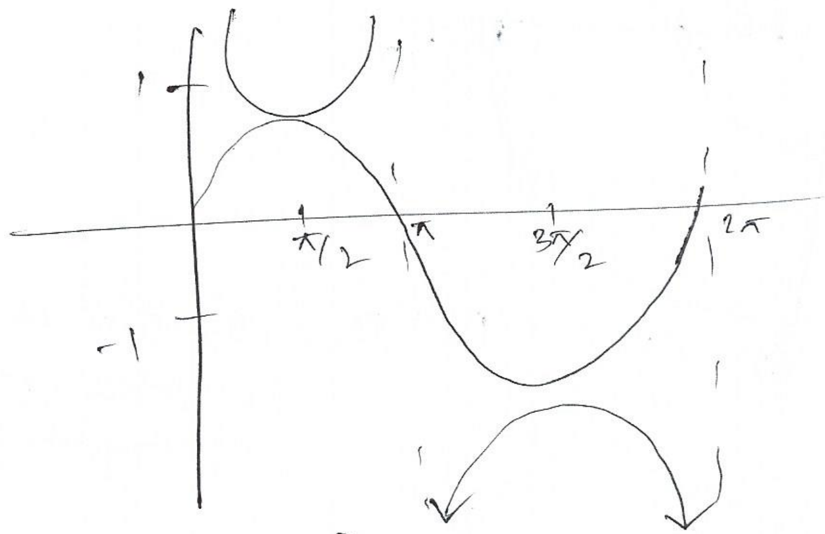
x - int : $-\frac{\pi}{2}, \frac{\pi}{2}, \frac{3\pi}{2}$

odd function.

$y = -2\cot(\pi x) + 1$. → chang y-values

x value $T = \frac{\pi}{\omega} = \frac{\pi}{\pi} = 1$

$y = \csc x = \frac{1}{\sin x}$



$(0, \pi)$

csc x are U-shapes connected to sin x at top, bottom of wave.

D: $\mathbb{R}$ $x \neq 0, \pi, 2\pi$

R: $[-\infty, 1) \cup [1, \infty)$

$\csc \geq 1$ or $\csc x \leq -1$

$y = 2\csc x - 1$

$T = \frac{\pi}{\omega} = \frac{2\pi}{1} = 2\pi$