Wednesday, December 12, 2018
4:23 PM

4.6C & 4.6D: Cosecant & Secant Graphs ; Name: KEY

THESE ARE YOUR NOTES!

sin csc
cos sec

$f(x) = cscx = \frac{1}{sinx}$

$f(x) = secx = \frac{1}{cosx}$

Cosecant Vertical Asymptotes

$x \neq n\pi$

Secant Vertical Asymptotes

$x \neq \frac{\pi}{2} + n\pi$

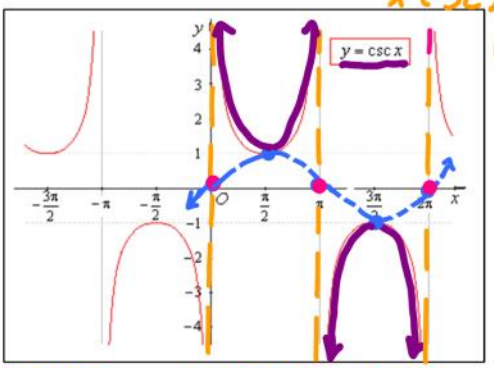
We will graph Cosecant and Secant *from* Sine and Cosine graphs

X-intercepts of sine and cosine graphs become vertical asymptotes of cosecant and secant graphs.

y = sinx

Graph of Cosecant

* when sinx = 0
* csc x = $\frac{1}{0}$ = undef.

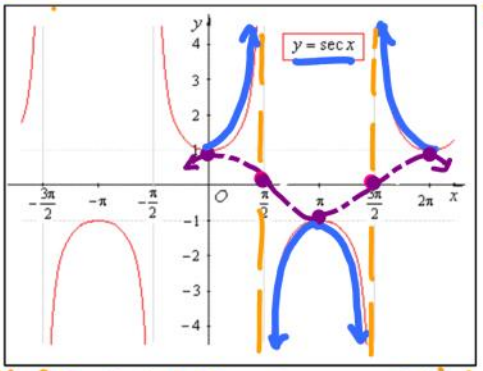


* Asymptotes: multiples of π

y = cosx

Graph of Secant

* when cosx = 0
* sec x = $\frac{1}{0}$ = undef



* Asymptotes: $\frac{\pi}{2}$ + multiples of π

1. Graph $y = 2\csc(2x - \pi)$ and identify the following:

* graph Reciprocal: y = 2 Sin (2x - π)

Amplitude: ~~2~~

Range: $(-\infty, -2] \cup [2, \infty)$

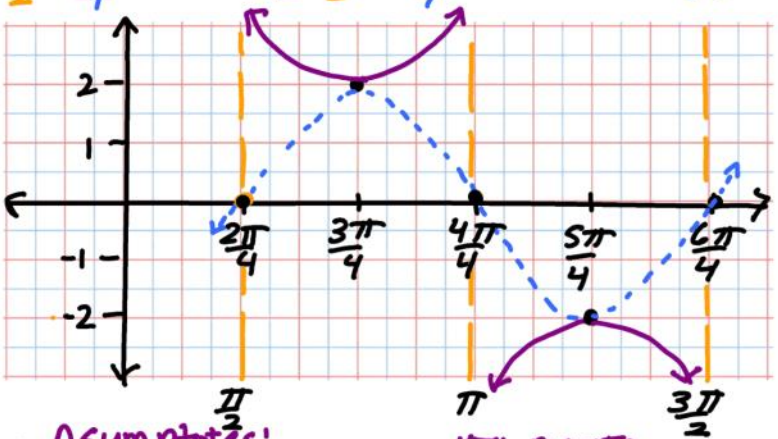
Period: $\frac{2\pi}{2} = \pi$ ($\frac{2\pi}{b}$)

* ~~Phase~~ HORIZ. Shift: $\frac{\pi}{2}$ Right

* Start: $\frac{\pi}{2} \cdot \frac{2}{2} = \frac{2\pi}{4}$ ** End: $\frac{3\pi}{2} \cdot \frac{2}{2} = \frac{6\pi}{4}$

One cycle: $[\frac{\pi}{2}, \frac{3\pi}{2}]$

Scale: $\frac{\pi}{4}$ Per. $\frac{\pi}{4}$



* bx - c = 0
2x - π = 0
2x = π
x = $\frac{\pi}{2}$

** bx - c = 2π
2 π = 2π
2 / = 3π
x = $\frac{3\pi}{2}$

Key Elements: Asymptotes: x = $\frac{\pi}{2}$, x = π, x = $\frac{3\pi}{2}$

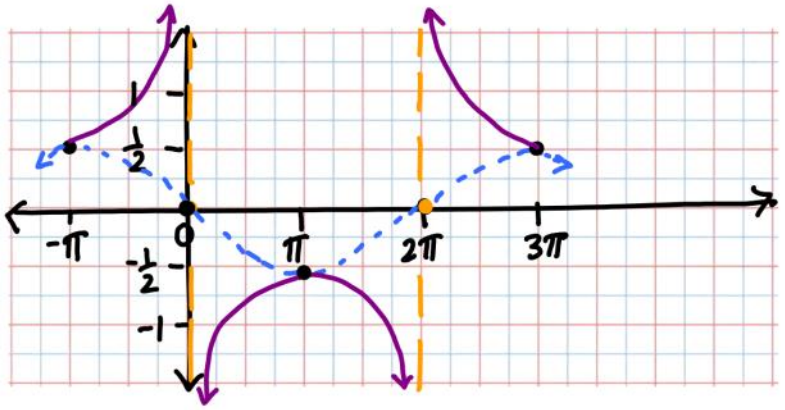
KEY POINTS: $(\frac{3\pi}{4}, 2)$, $(\frac{5\pi}{4}, -2)$

2. Graph $y = \frac{1}{2}\sec(\frac{x}{2} + \frac{\pi}{2})$ and identify the following:

*Graph Reciprocal: $y = \frac{1}{2}\cos(\frac{x}{2} + \frac{\pi}{2})$ $\frac{1}{2}(x+\pi)$

Amplitude: ~~$\frac{1}{2}$~~ none Range: $(-\infty, -\frac{1}{2}] \cup [\frac{1}{2}, \infty)$ Period: $\frac{2\pi}{\frac{1}{2}} = 4\pi$ $\frac{2\pi}{b}$ *HORIZ. ~~Phase~~ Shift: π left

* Start: $-\pi$ End: 3π One cycle: $[-\pi, 3\pi]$ Scale: $\frac{4\pi}{4} = \pi$



*bx-c=0
$\frac{x}{2} + \frac{\pi}{2} = 0$
$2(\frac{x}{2}) = (-\frac{\pi}{2})^2$
$x = -\pi$
bx-c = 2π
$\frac{x}{2} + \frac{\pi}{2} = 2\pi$
$\frac{x}{2} = 2\pi\frac{2}{2} - \frac{\pi}{2}$
$\frac{x}{2} = \frac{4\pi}{2} - \frac{\pi}{2}$
$2(\frac{x}{2}) = (\frac{3\pi}{2})^2$
$x = 3\pi$

*5 Key Elements: Asymptotes: $x = 0$ $x = 2\pi$ Points: $(-\pi, \frac{1}{2})$, $(\pi, -\frac{1}{2})$ $(3\pi, \frac{1}{2})$

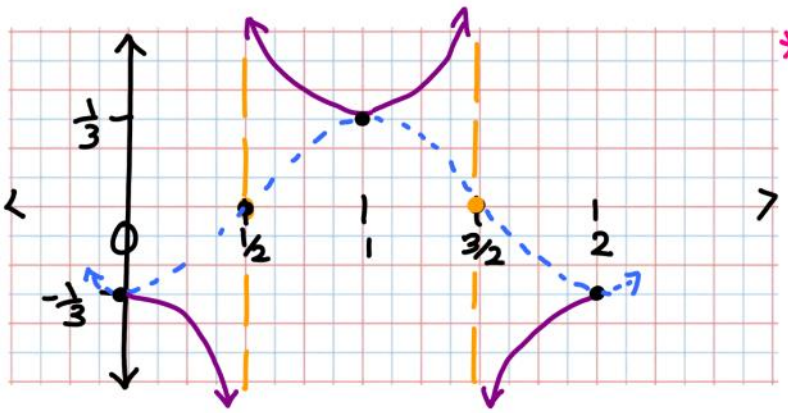
3. Graph $y = -\frac{1}{3}\sec\pi x$ and identify the following: $y = -\frac{1}{3}\cos\pi x$

Reflect over x-axis

Amplitude: ~~$\frac{1}{3}$~~ none Range: $(-\infty, -\frac{1}{3}] \cup [\frac{1}{3}, \infty)$ Period: $\frac{2\pi}{\pi} = 2$ HORIZ. ~~Phase~~ Shift: none

* Start: 0 ** End: 2 One cycle: $[0, 2]$ Scale: $\frac{2}{4} = \frac{1}{2}$

bx-c=0
πx = 0
x = 0



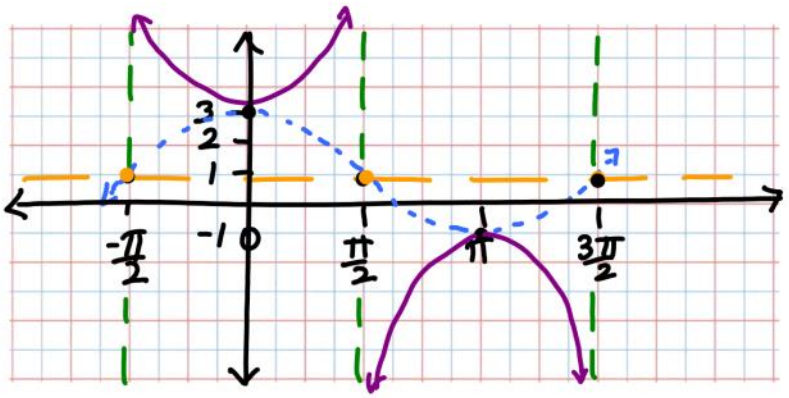
**bx-c = 2π
πx = 2π
$x = \frac{2\pi}{\pi}$
x = 2

Key Elements: Asymptotes: $x = \frac{1}{2}$ $x = \frac{3}{2}$ Points: $(0, -\frac{1}{3})$, $(1, \frac{1}{3})$, $(2, -\frac{1}{3})$

4. Graph $y = 2\csc\left(x + \frac{\pi}{2}\right) + 1$ and identify the following: $y = 2\sin\left(x + \frac{\pi}{2}\right) + 1$ vertical shift up 1

Amplitude: ~~2~~ Range: $(-\infty, -1] \cup [3, \infty)$ Period: 2π ~~Phase~~ Horiz. Shift: $\frac{\pi}{2}$ left

Start: $-\frac{\pi}{2}$ * End: $\frac{3\pi}{2}$ One cycle: $[-\frac{\pi}{2}, \frac{3\pi}{2}]$ Scale: $\frac{2\pi}{4} = \frac{\pi}{2}$



* $bx - c = 2\pi$

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

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

$x = \frac{4\pi}{2} - \frac{\pi}{2}$

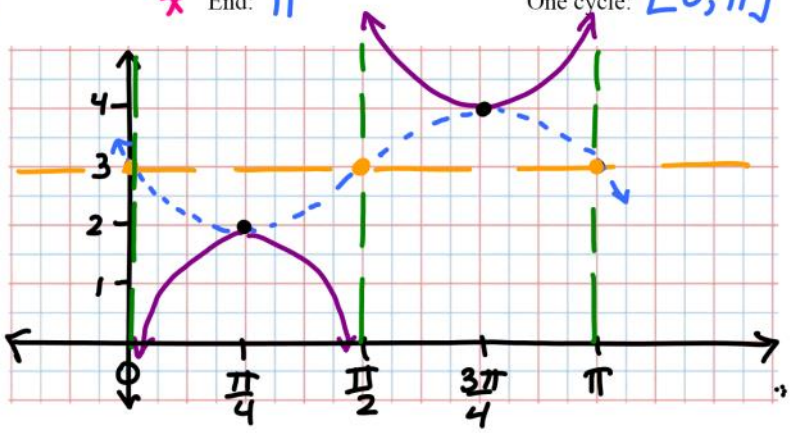
$x = \frac{3\pi}{2}$

Key Elements: Asymptotes: $x = -\frac{\pi}{2}, x = \frac{\pi}{2}, x = \frac{3\pi}{2}$ Points: $(0, 3), (\pi, -1)$

5. Graph $y = -csc2x + 3$ and identify the following: $y = -\sin 2x + 3$

Amplitude: ~~1~~ Range: $(-\infty, 2] \cup [4, \infty)$ Period: $\frac{2\pi}{2} = \pi$ ~~Phase~~ Horiz. Shift: none

Start: 0 * End: π One cycle: $[0, \pi]$ Scale: $\frac{\pi}{4}$



$bx - c = 2\pi$

$2x = 2\pi$

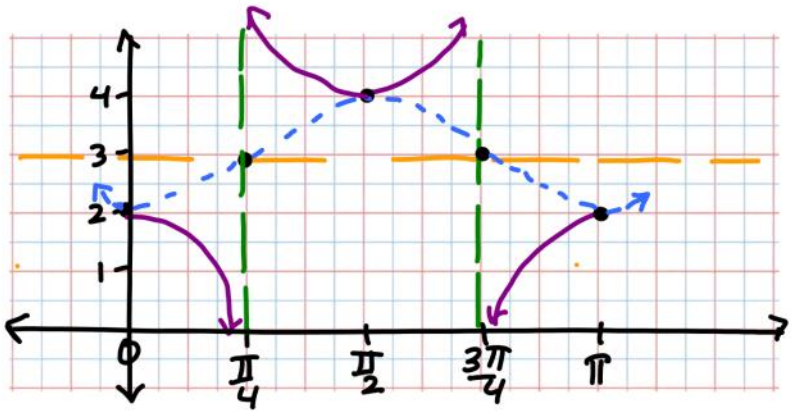
$x = \pi$

Key Elements: Asymptotes: $x = 0, x = \frac{\pi}{2}, x = \pi$ Points: $(\frac{\pi}{4}, 2), (\frac{3\pi}{4}, 4)$

6. Graph $y = -sec2x + 3$ and identify the following: $y = -\cos 2x + 3$

Amplitude: ~~1~~ Range: $(-\infty, 2] \cup [4, \infty)$ Period: $\frac{2\pi}{2} = \pi$ ~~Phase~~ HORIZ Shift:

Start: 0 * End: π One cycle: $[0, \pi]$ Scale: $\frac{\pi}{4}$



*BX-C=2π

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

$x = \pi$

Key Elements: Asymptotes: $x = \frac{\pi}{4}$, $x = \frac{3\pi}{4}$ Points: $(0,2), (\frac{\pi}{2}, 4), (\pi, 2)$

7. Graph $y = 2\sec\left(x + \frac{\pi}{2}\right) + 1$ and identify the following: $y = 2\cos(x + \frac{\pi}{2}) + 1$

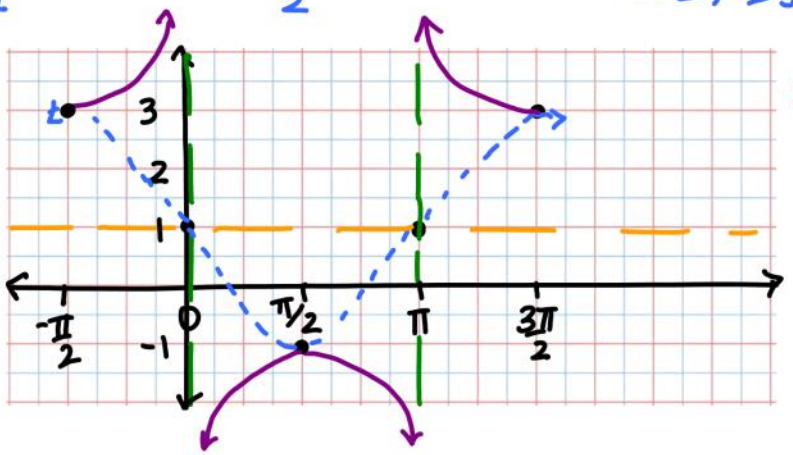
Amplitude: ~~2~~ Range: Period: 2π ~~Phase~~ HORIZ. Shift: $\frac{\pi}{2}$ left

* Start: $-\frac{\pi}{2}$ * End: $\frac{3\pi}{2}$ One cycle: $[-\frac{\pi}{2}, \frac{3\pi}{2}]$ Scale: $\frac{2\pi}{4} = \frac{\pi}{2}$

*bx-c=0

$x + \frac{\pi}{2} = 0$

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



*END

bx-c=2π

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

$x = \frac{3\pi}{2}$

Key Elements: Asymptotes: $x = 0$, $x = \pi$ Points: $(-\frac{\pi}{2}, 3), (\frac{\pi}{2}, -1)$ $(\frac{3\pi}{2}, 3)$

8. Graph $y = -\frac{1}{3}csc\pi x - 2$ and identify the following: $y = -\frac{1}{3}\sin\pi x - 2$

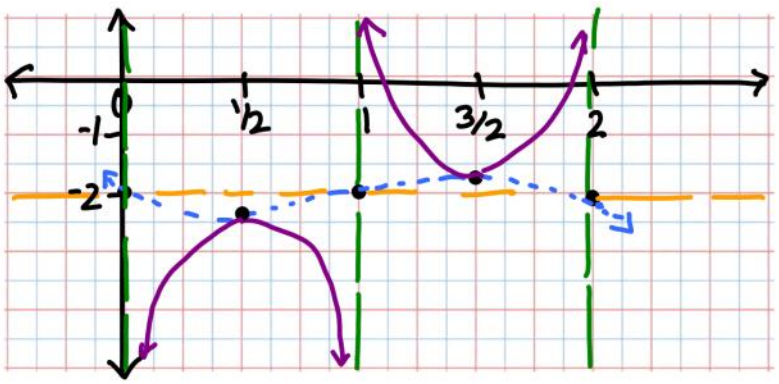
Amplitude: ~~$\frac{1}{3}$~~ Range: Period: $\frac{2\pi}{\pi} = 2$ ~~Phase~~ HORIZ Shift: none

Start: 0 * End: 2 One cycle: $[0, 2]$ Scale: $\frac{2}{4} = \frac{1}{2}$

$Bx - C = 0$

$\pi x = 0$

$x = 0$



* END

$Bx - C = 2\pi$

$\pi x = 2\pi$

$x = 2$

5 Key Elements: Asymptotes: $x = 0$, $x = 1$, $x = 2$

Points: $(\frac{1}{2}, -2\frac{1}{3})$, $(\frac{3}{2}, -1\frac{2}{3})$