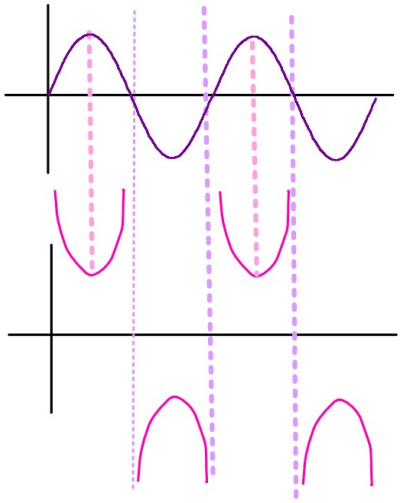
October 16

How is tangent related to
sine and cosine?
How is cotangent related to
sine and cosine?

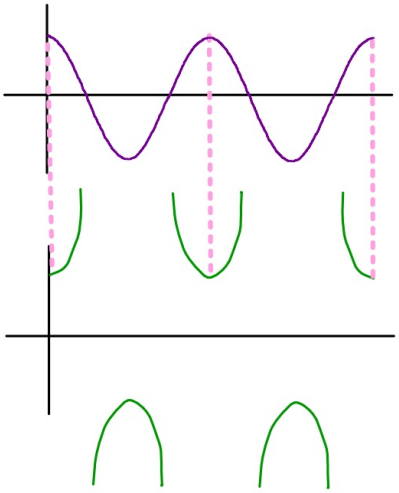
October 16

Students will verbally explain how to
graph all six trig functions
(using the words:
zero, asymptote, undefined...)



When sin(x) = 0, what is happening to csc(x)?

When sin(x) = 1, what is happening to csc(x)?



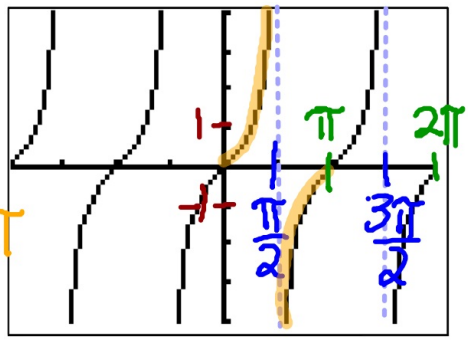
When cos(x) = 1, what is happening to sec(x)?

When cos(x) = 0, what is happening to sec(x)?

# Graph of tan(x)

$\left(\frac{\sin(x)}{\cos(x)}\right)$

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




Range:
all real numbers
$-\infty < y < \infty$

Domain:
all real numbers
except $x = \frac{\pi}{2}, \frac{3\pi}{2}, \ldots$

length of one cycle $= \pi$
$\left(\text{period} = \frac{\pi}{B}\right)$

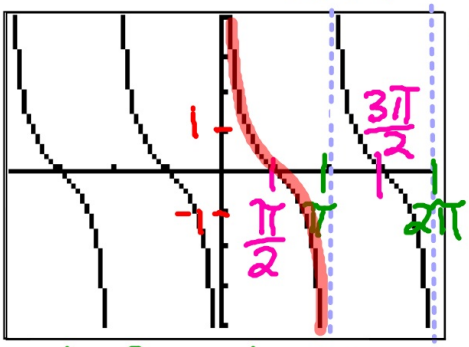
$\tan x = 0$ when $\sin x = 0$
$(x = 0, \pi, 2\pi, \ldots n\pi)$

undefined when $\cos x = 0$
$\left(x = \frac{\pi}{2}, \frac{3\pi}{2}, \ldots, \frac{(2n+1)\pi}{2}\right)$

## Graph of cot(x)

$\left(\frac{\cos(x)}{\sin(x)}\right)$

$$\cot(x) = \frac{\cos(x)}{\sin(x)}$$




Domain:
all real numbers
except $x = 0, \pi, 2\pi \ldots$

Range:
all real numbers
$-\infty < y < \infty$

Period $= \pi \left(= \frac{\pi}{B}\right)$

undefined when $\sin x = 0$
$(x = 0, \pi, 2\pi, \ldots n\pi)$

$\cot x = 0$ when $\cos x = 0$
$\left(x = \frac{\pi}{2}, \frac{3\pi}{2}, \ldots \frac{(2n+1)\pi}{2}\right)$

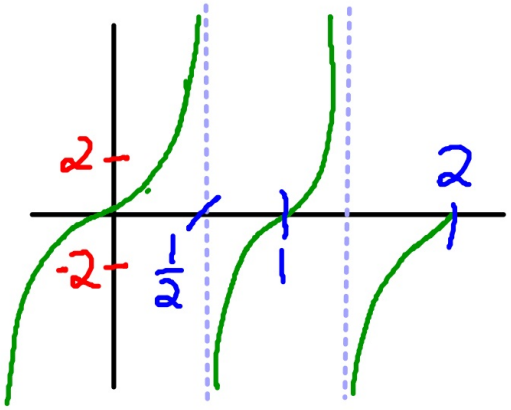
## Graph $y = 2\tan(\pi x)$ (graph 2 cycles)

Amplitude $= 2$
(label y-axis)

$(B = \pi)$

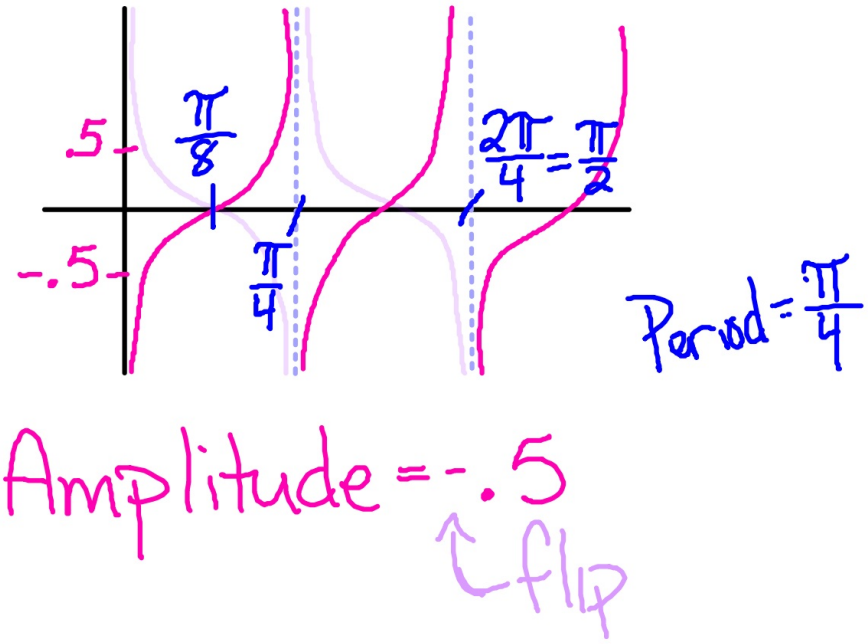
Period $= \frac{\pi}{B}$
$= \frac{\pi}{\pi} = 1$

No horizontal or vertical shifts



Graph

$y = -0.5\cot(4x)$




Set 3:

pg 178 #2 - 8 (even), 9 - 24 (multiples of 3)

1) $y = 4\sec(2x)$

Amplitude = 4

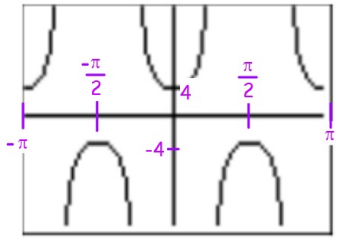
Vertical Shift = 0

New Range:

$y \le -4, y \le 4$

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

Horizontal Shift = 0




2) $y = 3\sec(\pi x)$

Amplitude = 3

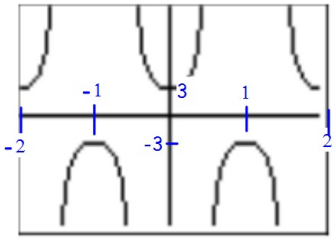
Vertical Shift = 0

New Range:

$y \le -3, y \le 3$

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

Horizontal Shift = 0




3) $y = 5\csc\left(\frac{\pi x}{4}\right)$

Amplitude = 5

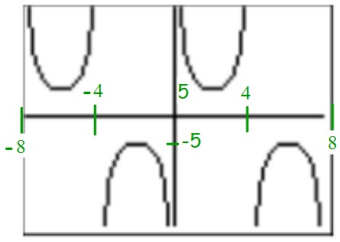
Vertical Shift = 0

New Range:

$y \le -5, y \le 5$

Period = $\frac{2\pi}{(\pi/4)} = 8$

Horizontal Shift = 0




4) $y = 3 + \sec(x)$

Amplitude = 1

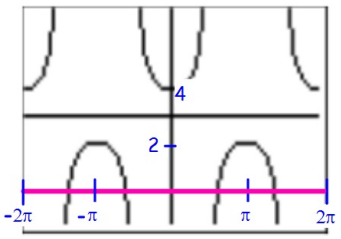
Vertical Shift = 3

New Range:

$y \le 2, y \le 4$

Period = $\frac{2\pi}{1} = 2\pi$

Horizontal Shift = 0




5) $y = \csc(x) - 2$

Amplitude = 1

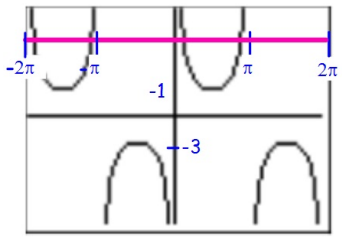
Vertical Shift = -2

New Range:

$y \le -3, y \le -1$

Period = $\frac{2\pi}{1} = 2\pi$

Horizontal Shift = 0




6) $y = \csc(x) + 4$

Amplitude = 1

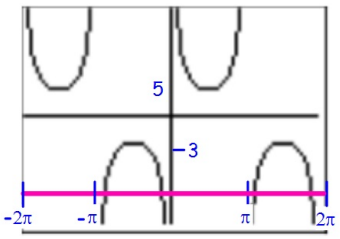
Vertical Shift = 4

New Range:

$y \le 3, y \le 5$

Period = $\frac{2\pi}{1} = 2\pi$

Horizontal Shift = 0



7) $y = \csc\left(x - \frac{\pi}{4}\right)$

Amplitude = 1

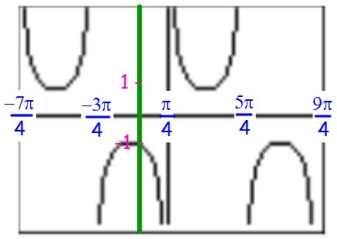
Vertical Shift = 0

New Range:

$y \le -1, y \ge 1$

Period = $2\pi$

Horizontal Shift = $\frac{-c}{b} = \frac{-(-\pi/4)}{1} = \frac{\pi}{4}$




8) $y = \sec\left(x + \frac{\pi}{2}\right)$

Amplitude = 1

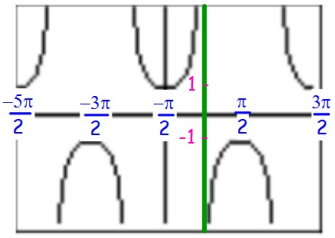
Vertical Shift = 0

New Range:

$y \le -1, y \ge 1$

Period = $2\pi$

Horizontal Shift = $\frac{-c}{b} = \frac{-(\pi/2)}{1} = \frac{-\pi}{2}$




9) $y = \csc(4\pi x - \pi)$

Amplitude = 1

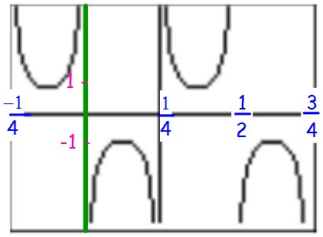
Vertical Shift = 0

New Range:

$y \le -1, y \ge 1$

Period = $(2\pi)/(4\pi) = 1/2$

Horizontal Shift = $\frac{-c}{b} = \frac{-(-\pi)}{4\pi} = \frac{1}{4}$




10) $y = -2\sec\left(2x + \frac{\pi}{2}\right) - 3$

Amplitude = 2

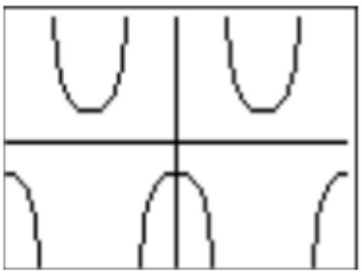
Vertical Shift = -3

New Range:

$y \le -5, y \ge -1$

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

Horizontal Shift = $\frac{-(\pi/2)}{2} = \frac{-\pi}{4}$



11) $y = 3\csc\left(\frac{\pi x}{4} - 1\right) + 2$

Amplitude = 3

Vertical Shift = 2

New Range:

$y \le 1, y \ge 5$

Period = $\frac{2\pi}{(\pi/4)} = 8$

Horizontal Shift = $\frac{-(-1)}{(\pi/4)} = \frac{4}{\pi}$