5.4 Part 1 More Trigonometric Graphs

Tan and cot have a different period than sin & cos.
Their period is π. Why do you think this is so?

Example 1

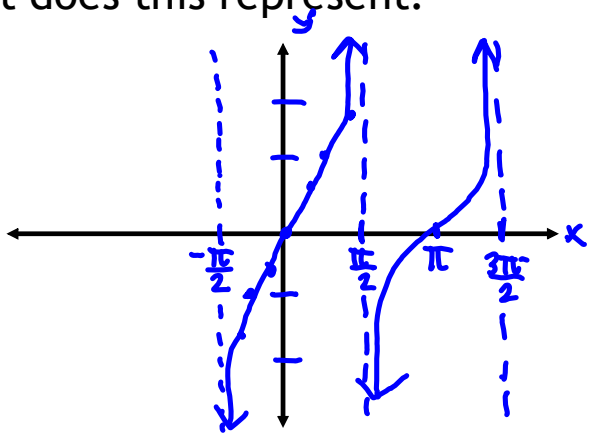
Make a table and graph y = tan x.

Where is tan undefined? What does this represent?

asymptote

x	y
$-\pi/2$	undefined
$-\pi/3$	−1.73
$-\pi/4$	−1
$-\pi/6$	−.58
0	0
$\pi/6$	.58
$\pi/4$	1
$\pi/3$	1.73
$\pi/2$	undefined

x	y
$2\pi/3$	−1.73
$3\pi/4$	−1
$5\pi/6$	−.58
π	0
$7\pi/6$	.58
$5\pi/4$	1
$4\pi/3$	1.73
$3\pi/2$	undefined



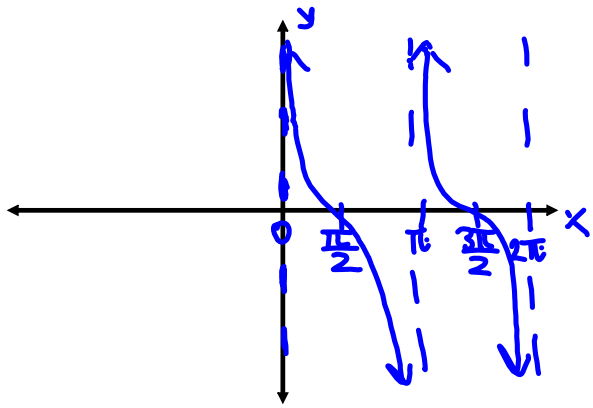
Example 2

Make a table and graph y = cot x.

Where is cot undefined?

x	y
0	undefined
$\pi/6$	1.73
$\pi/4$	1
$\pi/3$	.58
$\pi/2$	0
$2\pi/3$	−.58
$3\pi/4$	−1
$5\pi/6$	−1.73
π	undefined

x	y
$7\pi/6$	1.73
$5\pi/4$	1
$4\pi/3$	.58
$3\pi/2$	0
$5\pi/3$	−.58
$7\pi/4$	−1
$11\pi/6$	−1.73
2π	undefined



Tangent and Cotangent Functions

$y = a \tan k(x - b)$ and $y = a \cot k(x - b)$

The period is found by $\frac{\pi}{k}$.

To sketch a complete period, select an interval between vertical asymptotes.

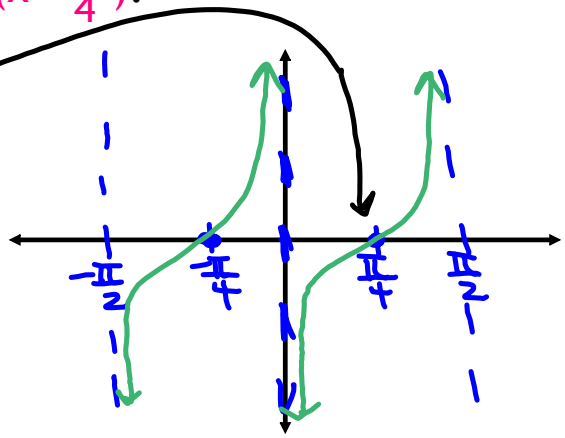
Example 3

Graph $y = \tan 2(x - \frac{\pi}{4})$.

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

ps $= \frac{\pi}{4}$ right

$\frac{1}{2} \cdot \frac{\pi}{2} = \frac{\pi}{4}$



Example 4

Graph $y = 2 \cot (3x + \frac{\pi}{2})$.

amp $= 2$ $y = 2 \cot 3(x + \frac{\pi}{6})$

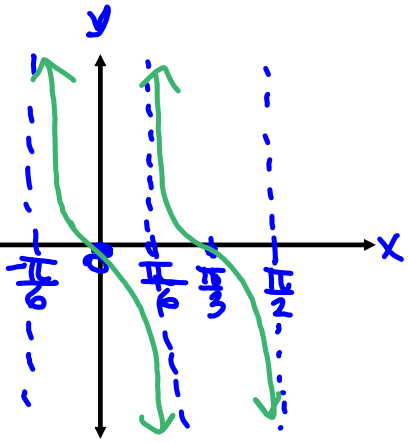
per $= \frac{\pi}{3}$

ps $= \frac{\pi}{6}$ left

$-\frac{\pi}{6} + \frac{\pi}{3} = -\frac{\pi}{6} + \frac{2\pi}{6} = \frac{\pi}{6}$ (s.p. to end)

$\frac{\pi}{6} + \frac{\pi}{3} = \frac{\pi}{6} + \frac{2\pi}{6} = \frac{3\pi}{6} = \frac{\pi}{2}$ (s.p. to end)

$\frac{1}{2}(\frac{\pi}{6} + \frac{\pi}{2}) = \frac{1}{2}(\frac{\pi}{6} + \frac{3\pi}{6}) = \frac{1}{2} \cdot \frac{4\pi}{6} = \frac{\pi}{3}$



5.4 Part 2 More Trigonometric Graphs

Because csc and sec are reciprocals of sin and cos, they have the same period of 2π.

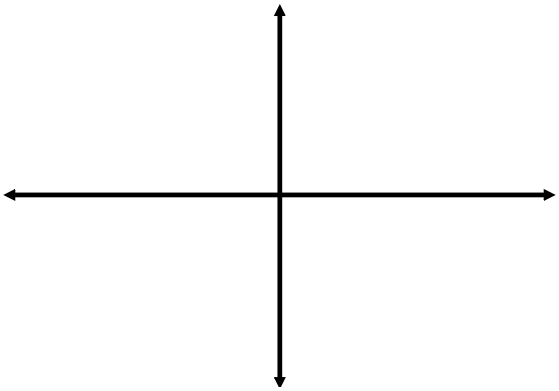
To graph csc and sec, we use the reciprocal identities.

$\csc x =$ $\sec x =$

To graph $y = \csc x$, we take the reciprocals of the y-coordinates of the points of the graph $y = \sin x$.

Example 1

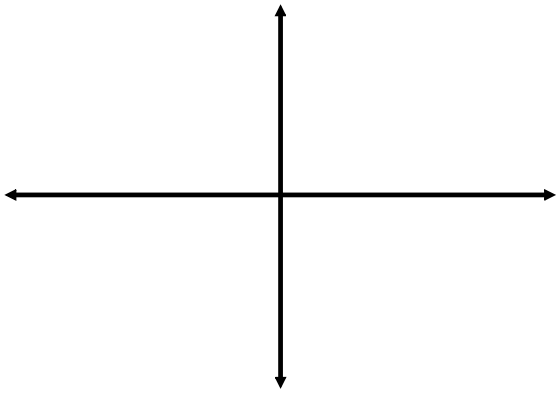
Graph $y = \csc x$.



To graph $y = \sec x$, we take the reciprocals of the y-coordinates of the points of the graph $y = \cos x$.

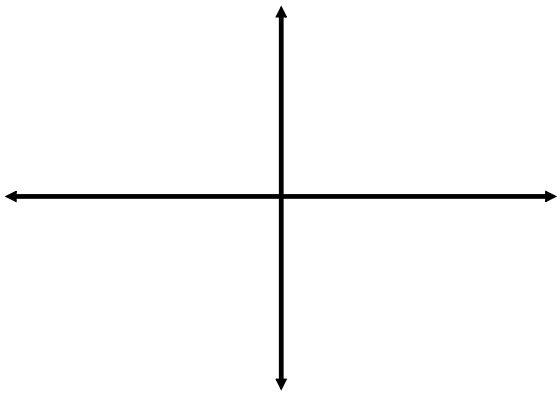
Example 2

Graph $y = \sec x$.



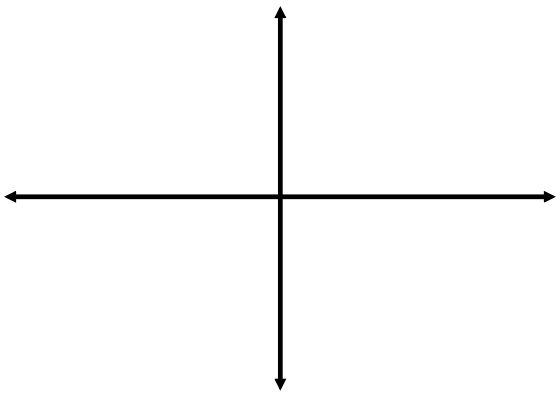
Example 3

Graph $y = -4 \sec (2x + \frac{\pi}{2})$.



Example 4

Graph $y = \frac{1}{2} \csc (3x - \pi)$.



ALL SIX TRIGONOMETRIC FUNCTIONS