Objective: Translate $y = \sin x$ and $y = \cos x$

Transformations of $y = \tan x$

Recall the graph of $y = \tan x$ with period $\pi$

$$y = \tan x$$

The graph below shows the transformation $y = \tan 3x$ of the function, $y = \tan x$.

The period is $p = \frac{\pi}{3}$. You can also see this as $\frac{\pi}{6} = \frac{\pi}{3}$.

You can also see this as $y = \tan \left( x + \frac{3\pi}{4} \right)$.
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**Graphing** \( y = \csc x, y = \sec x, y = \cot x \)

Recall that \( \csc x = \frac{1}{\sin x} \). Below you can see how to graph \( y = \csc x \) on a calculator.

Since \( y = \sin x = 0 \) for \( x = n\pi \), where \( n \) is an integer, the domain of \( y = \csc x \) is all real numbers except \( x = n\pi \). Note that the range is defined for all real numbers except for the interval \((-1,1)\). You can write the range as \((-\infty,-1] \cup [1,\infty)\).

Recall that \( \sec x = \frac{1}{\cos x} \). Below you can see how to graph \( y = \csc x \) on a calculator.

Since \( y = \cos x = 0 \) for \( x = \frac{\pi}{2} + n\pi \), where \( n \) is an integer, the domain of \( y = \sec x \) is all real numbers except \( x = \frac{\pi}{2} + n\pi \). Note that the range is defined for all real numbers except for the interval \((-1,1)\). You can write the range as \((-\infty,-1] \cup [1,\infty)\).
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Recall that $\cot x = \frac{1}{\tan x}$. Below you can see how to graph $y = \csc x$ on a calculator.

Since $y = \tan x = 0$ for $x = n\pi$, where $n$ is an integer, the domain of $y = \cot x$ is all real numbers except $x = n\pi$. Note that the range is defined for all real numbers