

Objective: Graph csc and sec using knowledge of sin and cos.

Graphs of Cosecant and Secant

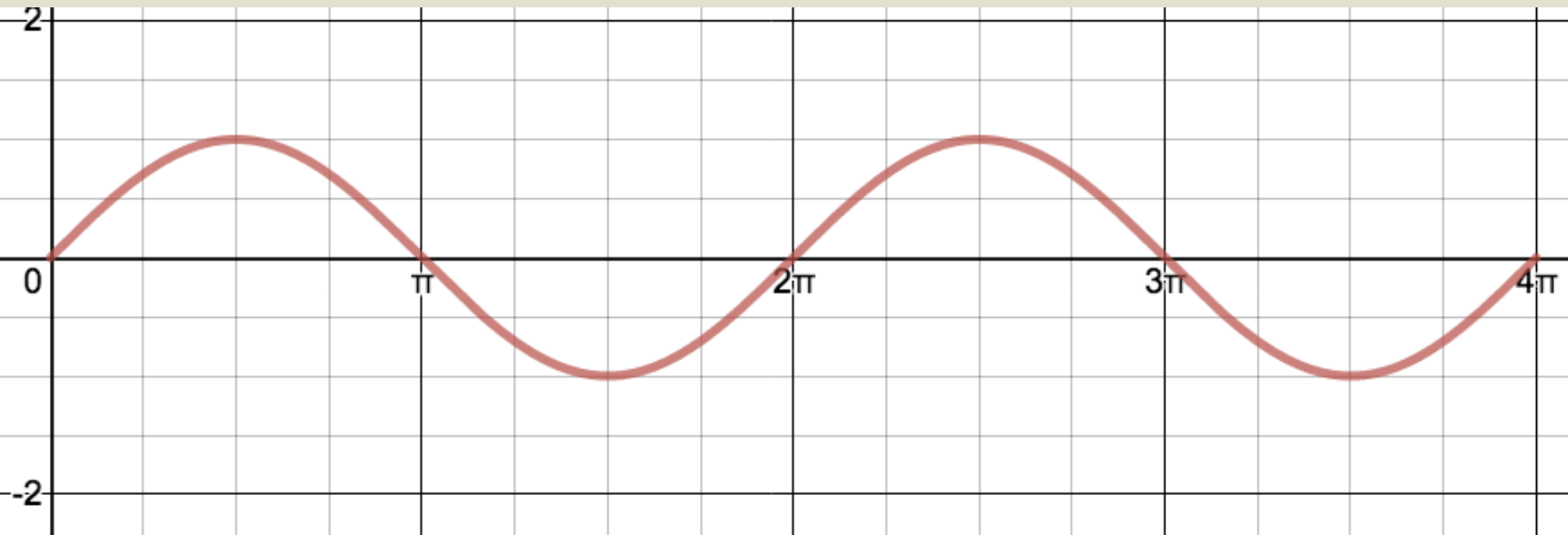
Since cosecant is the reciprocal of sine, we can graph it using some of the same properties we use for a sine graph.

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

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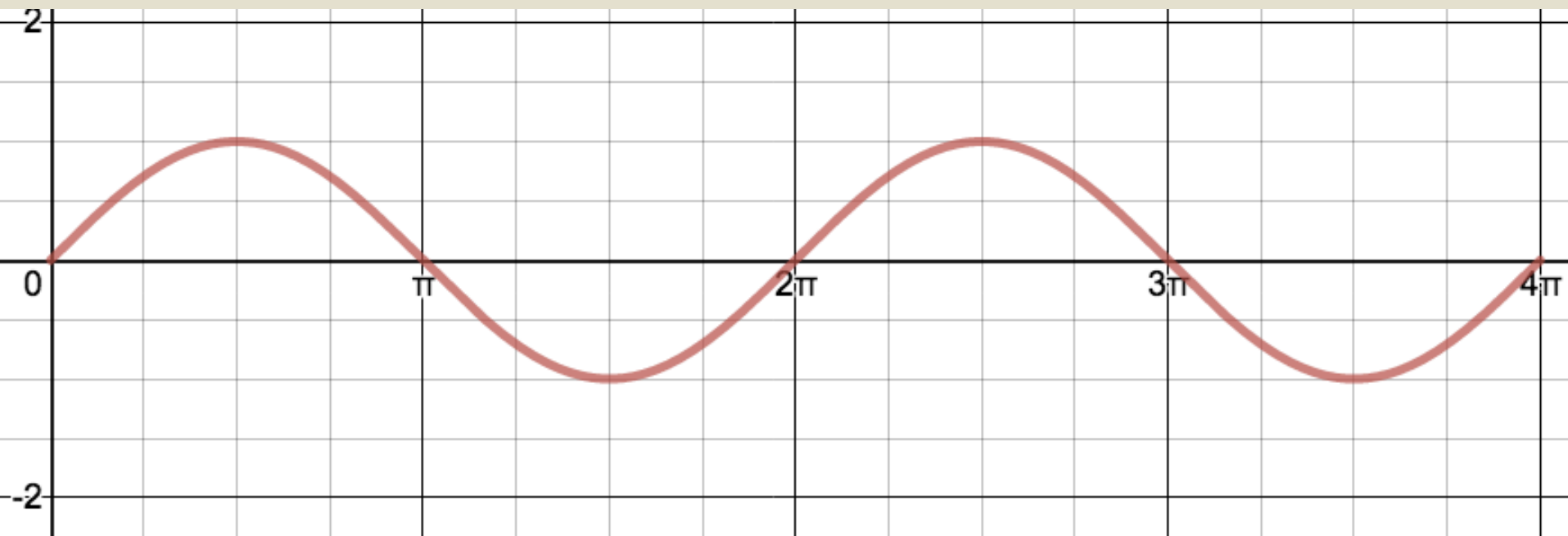
Let's start by looking at the graph of sine.



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Since $\csc x = \frac{1}{\sin x}$, we just have to actually plug in those values and divide to get the csc value. Let's do that for some key points:



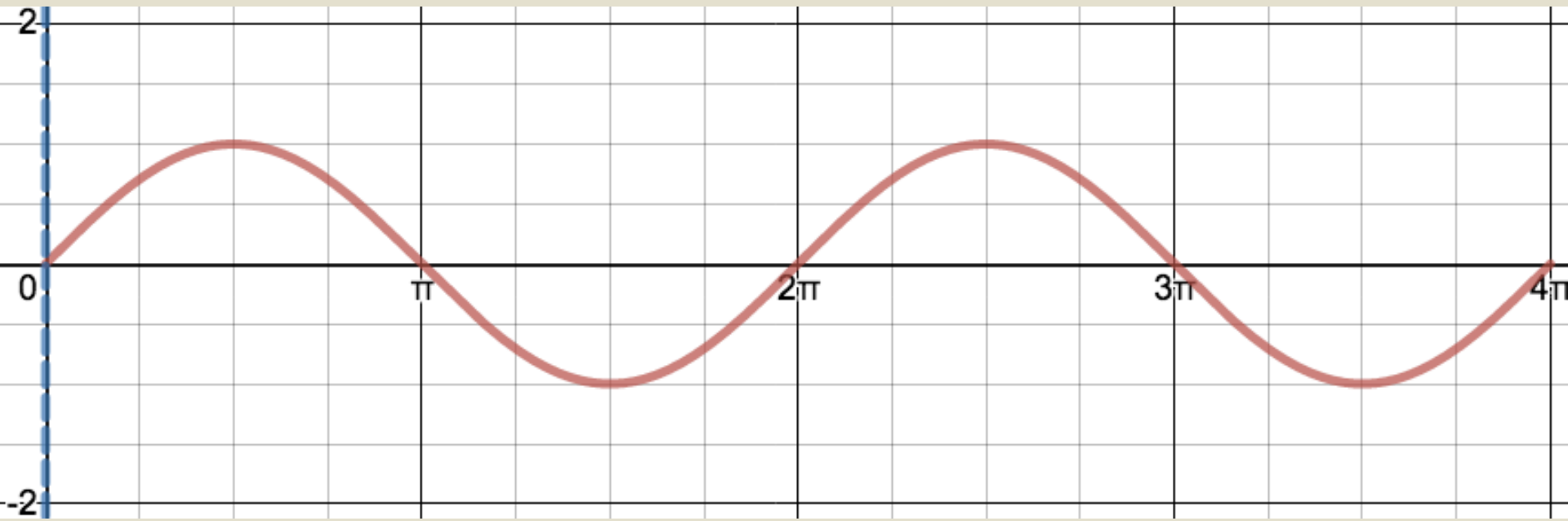
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So at $x=0$ we have $\sin x = 0$. Plug that in to our equation:

$$\csc x = \frac{1}{\sin x} = \frac{1}{0} = \textit{undefined}$$

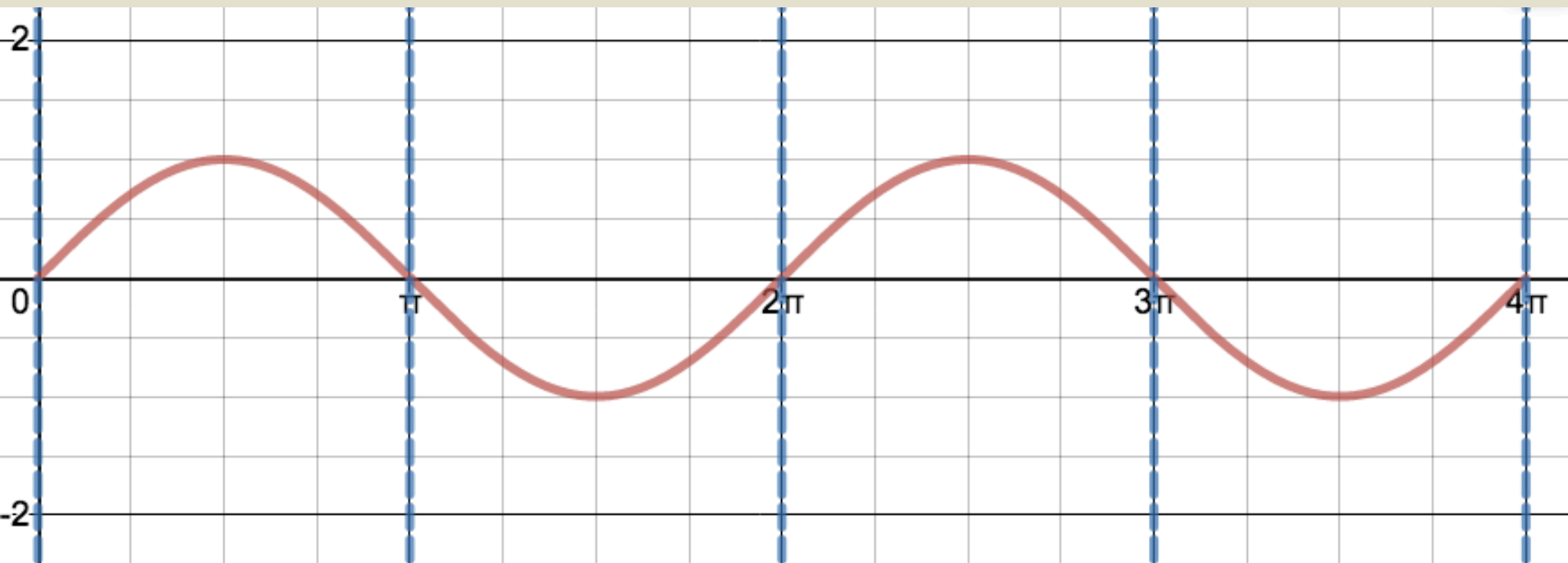
Undefined values will give a vertical asymptote at $x = 0$.



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Now we know that any time $\sin x = 0$ then csc is undefined and will have a vertical asymptote:



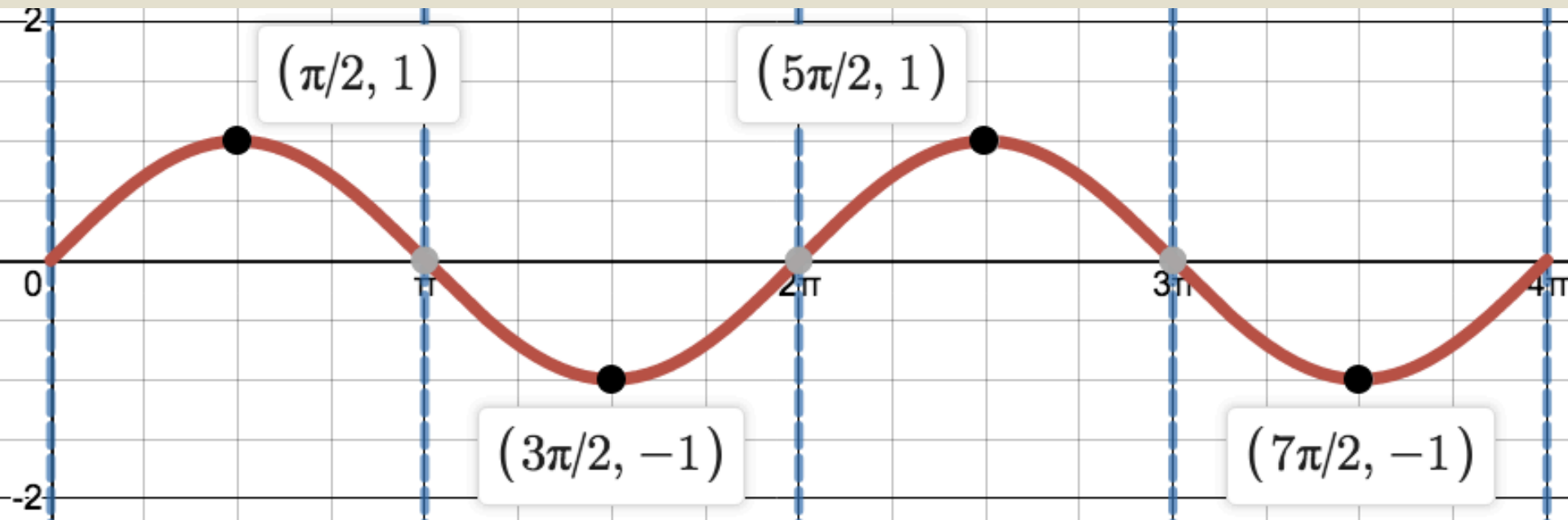
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At $x = \pi/2$ we have $\sin x = 1$. Plug that in to our equation:

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

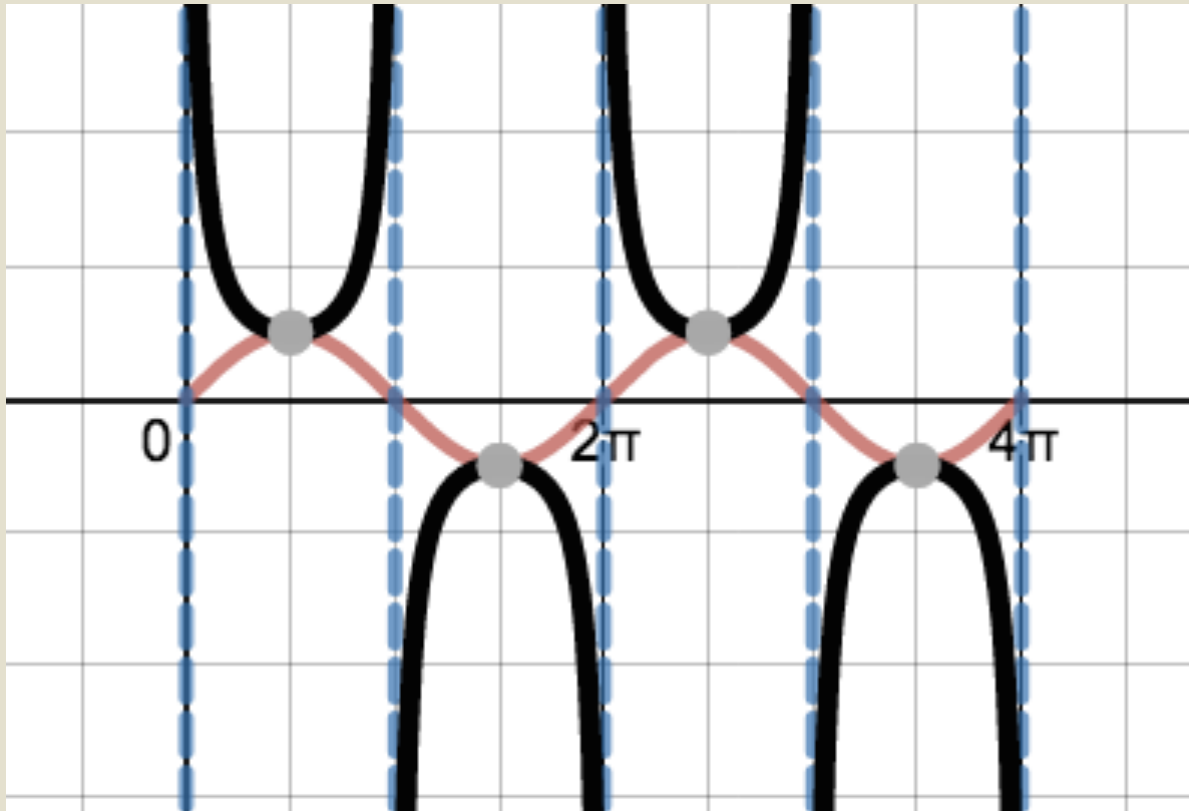
Similarly, at $x = 3\pi/2$ we have $\sin x = -1$ giving

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



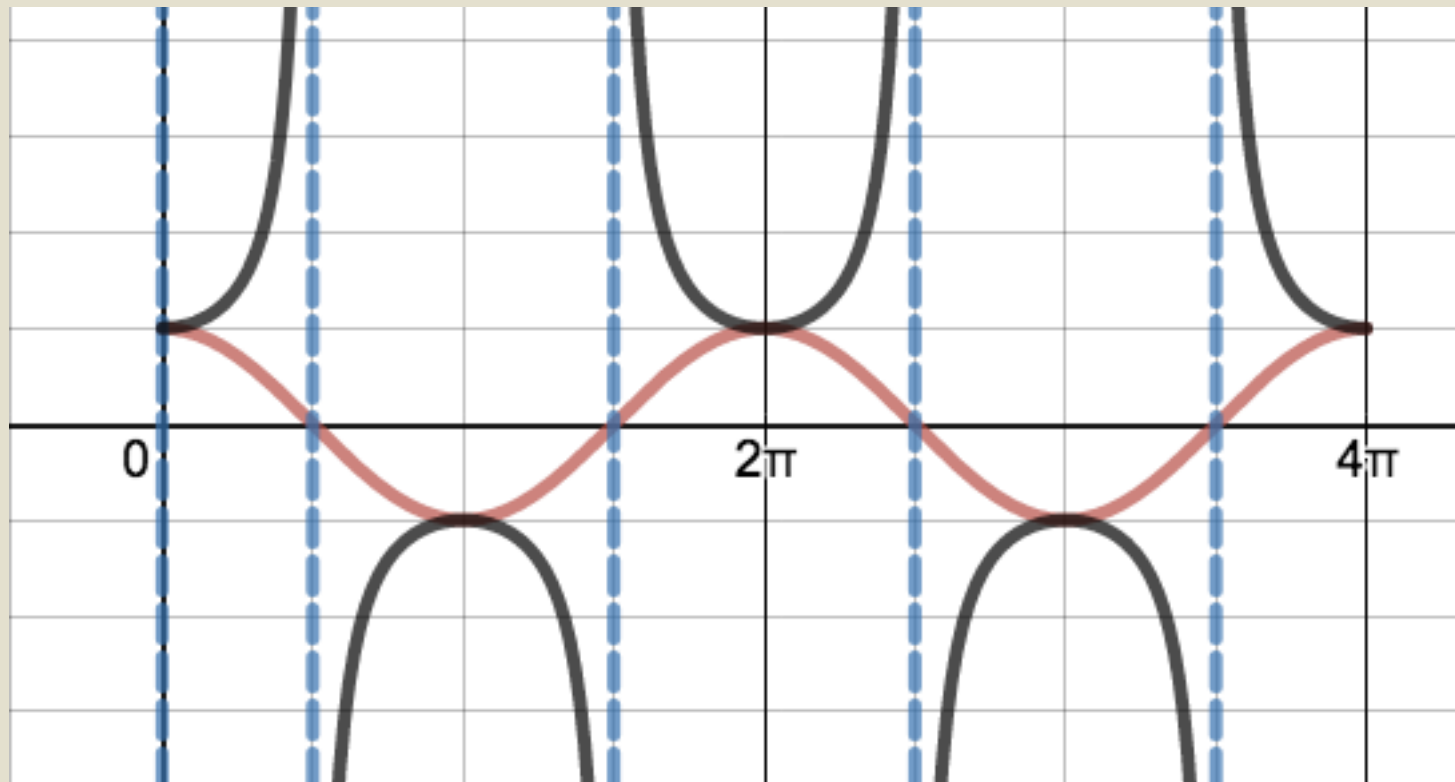
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If we take some x values close to an asymptote, we can see that the value gets bigger and bigger so the graph approaches each asymptote, basically creating these U shapes. The black is the graph of $\csc x$.



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A similar process can be used to graph sec x since it is the reciprocal of $\cos x$.



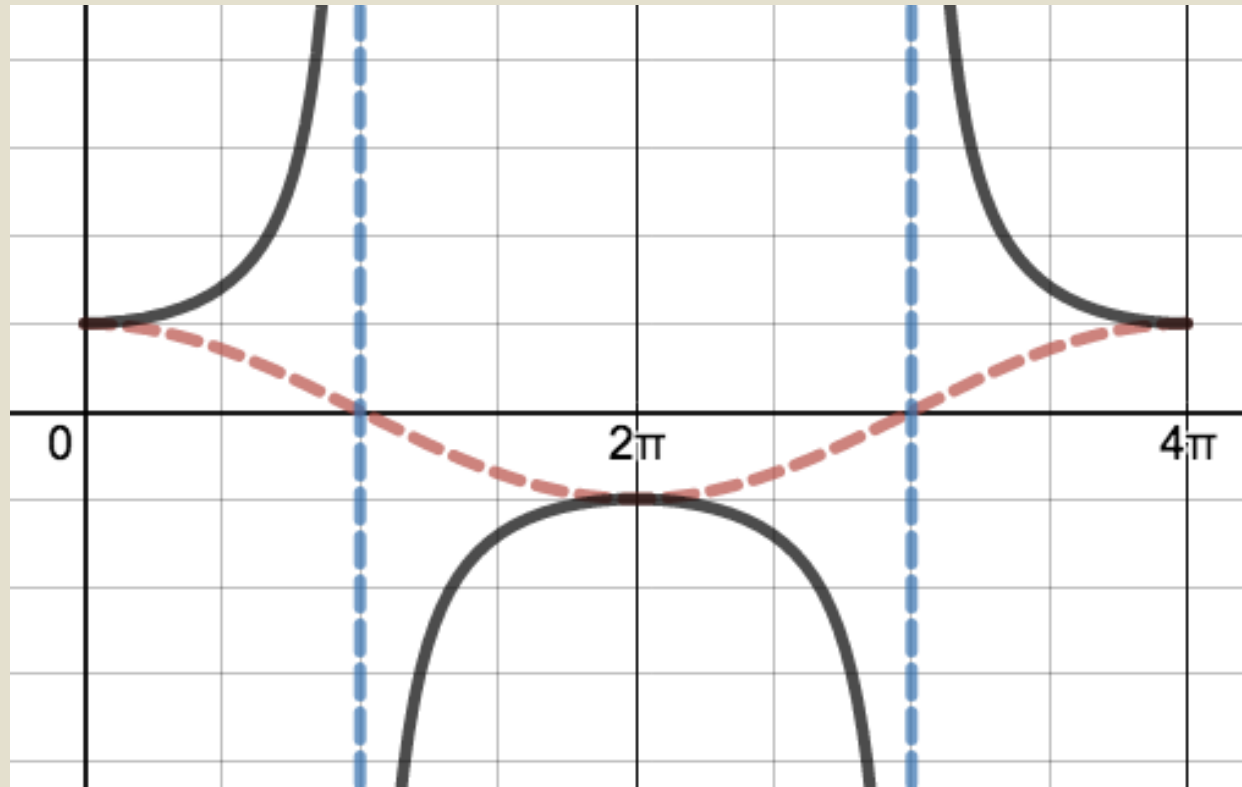
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So any time you want to graph cosecant or secant, you can graph the corresponding sine or cosine graph (lightly) and then draw the asymptotes and U shapes to get the final graphs.

Here is $\sec\left(\frac{x}{2}\right)$

based on graphing

$$\cos\left(\frac{x}{2}\right)$$



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Assignment:

Log in to Office 365/Teams

Complete the assignment:

Graphing Cosecant and Secant_ (Week 6, Day 1)

SHOW ALL YOUR WORK!

NO WORK = NO CREDIT