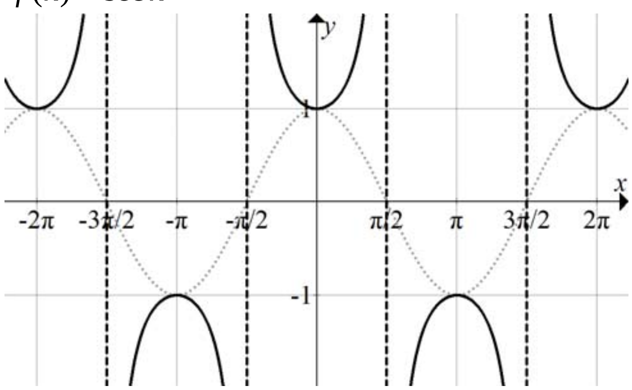
Section 5.3a
Graphs of the Secant and Cosecant Functions

The Secant Graph

RECALL: $\sec x = \dfrac{1}{\cos x}$ so where $\cos x = 0$, $\sec x$ has an asymptote.

To graph $y = A\sec(Bx - C) + D$, first graph, **THE HELPER GRAPH**, $y = A\cos(Bx - C) + D$.

$f(x) = \sec x$



Period: 2π

Vertical Asymptote: $x = \dfrac{k\pi}{2}$, k is an odd integer

Example 1: Let $f(x) = \sec\left(\dfrac{\pi x}{2}\right)$.

a. Give two asymptotes.

b. Sketch its graph by first stating and sketching its helper graph.

Helper function:

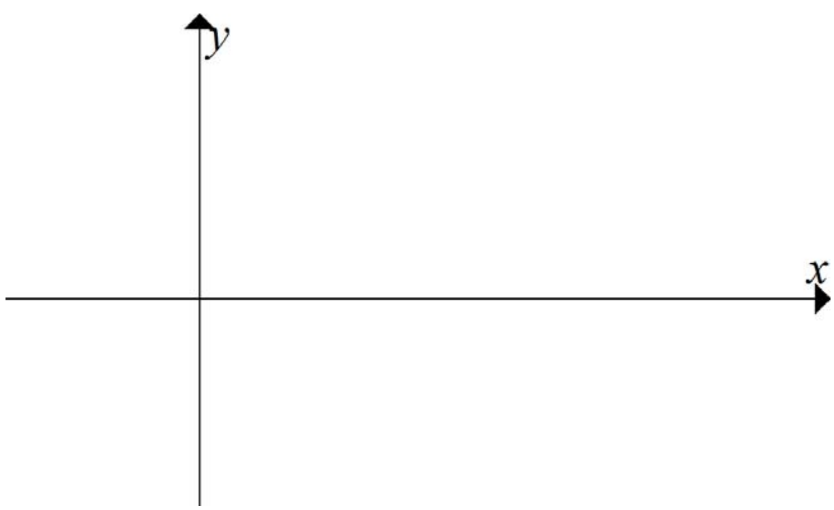
Amplitude: $|A|$ =

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

Phase Shift: $\frac{C}{B}$ =

One cycle begins at the phase shift and ends at: $\frac{C}{B}+\frac{2\pi}{B}$

Any other transformations?

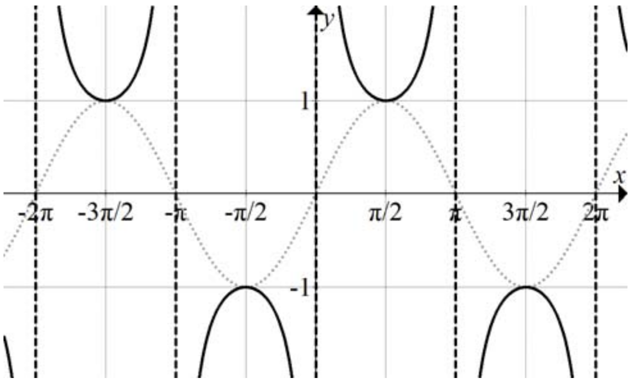


The Cosecant Graph

RECALL: $\csc x = \dfrac{1}{\sin x}$ so where $\sin x = 0$, $\csc x$ has an asymptote.

To graph $y = A\csc(Bx - C) + D$, first graph, **THE HELPER GRAPH**, $y = A\sin(Bx - C) + D$.

Cosecant: $f(x) = \csc x$



Period: 2π
Vertical Asymptote: $x = k\pi$, k is an integer

Example 2: Let $f(x) = 4\csc\left(2x - \dfrac{\pi}{2}\right)$

a. Give two asymptotes.

b. Sketch its graph by first stating and sketching the helper graph.

Helper function:

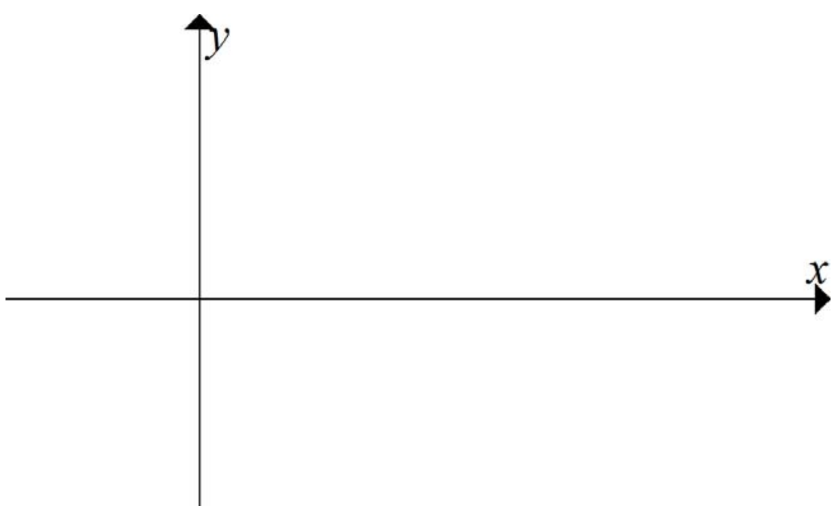
Amplitude: $|A|$ =

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

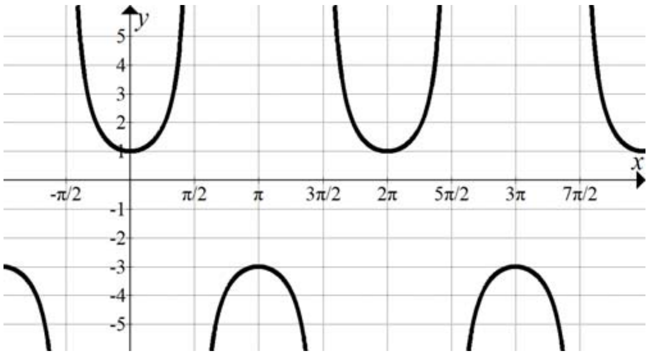
Phase Shift: $\frac{C}{B}$ =

One cycle begins at the phase shift and ends at: $\frac{C}{B}+\frac{2\pi}{B}$

Any other transformations?

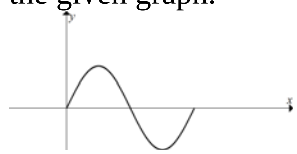


Example 3: Give an equation of the form $f(x) = A\csc(Bx - C) + D$ which could be used to represent the given graph. (Note: C or D may be zero.)



Step One:

Let's begin by recalling one cycle of the basic sine graph. Then choose one cycle on the given graph.



Amplitude: A = $\dfrac{M - m}{2}$ =

Vertical Shift, D: It'll be half-way between the maximum and the minimum values.

Use the period to find B: Recall the period formula $\dfrac{2\pi}{B}$ =

Compare your chosen cycle to the basic one cycle of sine. Any other transformations?

a. $f(x) = -2\csc\left(x - \frac{1}{2}\pi\right) + 1$

b. $f(x) = -4\csc\left(x - \frac{1}{2}\pi\right) + 1$

c. $f(x) = -2\csc\left(x - \frac{1}{2}\pi\right)$

d. $f(x) = -2\csc\left(x - \frac{1}{2}\pi\right) - 1$

e. $f(x) = -4\csc\left(x - \frac{1}{2}\pi\right) - 1$