Algebra II/Trig B Name _____

Graphs of Cosecant, Secant, and Cotangent
With Shifts
Module 3, Unit 7, Lesson 10

Graphs of Cosecant and Secant

We obtain the graphs of the cosecant and secant curves by using the reciprocal identities

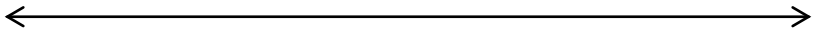
$$\csc x = \frac{1}{\sin x} \quad \text{and} \quad \sec x = \frac{1}{\cos x}$$

Steps to Graphing Cosecant and Secant

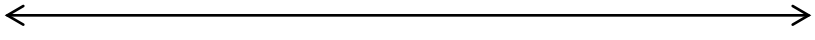
1. Graph the sine or cosine function.
    a. Dash the function.
2. Since cosecant and secant are reciprocal identities:
    a. Intercepts become asymptotes.
    b. Maximums become minimums.
    c. Minimums become maximums.

Example 1: Graph one period of the given function.

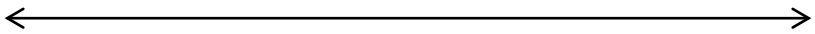
a. $f(x) = 3\sec(x + \pi)$



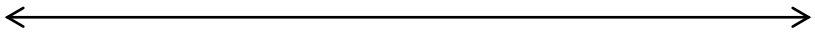
b. $y = \csc\left(2x - \frac{\pi}{2}\right) + 1$



c. $y = -3\csc\left(2\pi x + 4\pi\right)$



d. $y = -2\sec \pi x - 1$



Cotangent Functions y = A cot(Bx – C) + D

1. **Period** $\frac{\pi}{B}$
2. **Interval** = period x $\frac{1}{4}$
3. **Asymptotes (Phase Shift)** $Bx - C = 0$ and $Bx - C = \pi$
4. **vertical shift** D – shift up or down (New intercept)
5. Identify an x-intercept, midway between the consecutive asymptotes.
6. Find the critical points on the graph $\frac{1}{4}$ and $\frac{3}{4}$ of the way between consecutive asymptotes. These points have y-coordinates A and –A, respectively.

Example 2: Graph one period of the function.

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

b. $y = \cot\left(x + \frac{\pi}{4}\right)$

c. $y = 2\cot 2x - 1$