In this activity you will explore the graphs of the reciprocal trigonometric functions. Please scan your hand drawn graph and submit the entire lab in Dropbox.

You will be graphing the cosecant function in the same graphing window as the sine function below.

1. Since \( \csc \theta = \frac{1}{\sin \theta} \) the values for the \( \csc \theta \) can be found by reciprocating the values for the \( \sin \theta \). Fill in the chart below.

<table>
<thead>
<tr>
<th>( \theta )</th>
<th>0</th>
<th>( \frac{\pi}{6} )</th>
<th>( \frac{\pi}{3} )</th>
<th>( \frac{\pi}{2} )</th>
<th>( \frac{5\pi}{6} )</th>
<th>( \pi )</th>
<th>( \frac{7\pi}{6} )</th>
<th>( \frac{4\pi}{3} )</th>
<th>( \frac{3\pi}{2} )</th>
<th>( \frac{5\pi}{3} )</th>
<th>( \frac{11\pi}{6} )</th>
<th>( 2\pi )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \sin \theta )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \csc \theta )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Since \( \csc \theta = \frac{1}{\sin \theta} \), when will the \( \csc \theta \) be undefined? ________________________

3. How does the range of the sine function affect the domain of the cosecant function?

__________________________________________________________________________

4. Plot the cosecant function on the following Cartesian Coordinate plane. Two sine curves have been plotted below with the window from \(-2\pi \leq \theta \leq 2\pi\) and an x-scale of \( \frac{\pi}{6} \) and a y-scale of 1.
5. What is the domain of the cosecant function? ________________________________

6. What is the range of the cosecant function? ________________________________

7. What is the period of the cosecant function? ________________________________

8. Does the cosecant curve have an amplitude and explain? _______________________

9. Is this an odd function or an even function? Explain.

II. You will be graphing the secant function in the same graphing window as the cosine function below.

10. Since \( \sec \theta = \frac{1}{\cos \theta} \), the values for the \( \sec \theta \) can be found by reciprocating the values for the \( \cos \theta \). Fill in the chart below.

| \( \theta \) | 0 | \( \pi \) | \( \frac{\pi}{3} \) | \( \frac{\pi}{2} \) | \( \frac{2\pi}{3} \) | \( \frac{5\pi}{6} \) | \( \pi \) | \( \frac{7\pi}{6} \) | \( \frac{4\pi}{3} \) | \( \frac{3\pi}{2} \) | \( \frac{5\pi}{3} \) | \( \frac{11\pi}{6} \) | \( 2\pi \) \\
| cos \( \theta \) | | | | | | | | | | | | | |
| sec \( \theta \) | | | | | | | | | | | | | |

11. Since \( \sec \theta = \frac{1}{\cos \theta} \), when will the \( \sec \theta \) be undefined? ________________________________

12. How does the range of the cosine function affect the domain of the secant function?

13. Plot the secant function on the following Cartesian Coordinate plane. Two cosine curves have been plotted below with the window from \( -2\pi \leq \theta \leq 2\pi \) and an x-scale of \( \frac{\pi}{6} \) and a y-scale of 1.
14. What is the domain of the secant function? ________________________________

15. What is the range of the secant function? ________________________________

16. What is the period of the secant function? ________________________________

17. Does the secant curve have an amplitude and explain? _______________________

18. Is this an odd function or an even function? Explain.

On graph paper, sketch the graph of the following functions by hand then check your results on the calculator. Draw the sine or cosine function on the graph.

19. \( f(x) = 3\sec x \)

20. \( k(x) = 5\csc 2x + 3 \)

Using one of the graphing calculator apps, take a screen shot of the specific representation of the following functions. Then state the domain and range.

21. Take a screen shot of the table of \( f(x) = 2\csc x \).
22. Take a screen shot of the graph of \( g(x) = 2 \sec (x - \pi/2) \).

23. Compare the asymptotes to in the table of problem #21 to the graph of problem #22. What do you notice?

24. State the relative minimum and relative maximum values of problem #21 from the table.

25. State the relative minimum and relative maximum values of problem #22 from the graph.

26. Where you compared the relative minimum values and relative maximum values, what did you notice?

27. What conclusion can be formed from the two functions \( f(x) \) and \( g(x) \) in problems #21 & 22?