Names: _____

With your partner(s), read through the instructions and do the activities described. Only one report should be submitted from each group. This report is due Monday.

1. **The Graph of Cotangent**

   (a) Write $\cot x$ in terms of $\sin x$ and/or $\cos x$.

   Without graphing, find the zeros and vertical asymptotes of $\cot x$. Explain your reasoning.

   Without graphing, find the values of x between 0 and 2π for which $\cot x = 1$ and $\cot x = -1$. Explain your reasoning.

   (b) Plot $\cot x$ with *Mathematica*, sketch a graph showing two full periods, and analyze the graph. (Discuss the domain, range, continuity, intervals of increase/decrease, symmetries (including periodicity and period), boundedness, local extrema, horizontal/vertical asymptotes, and end behavior.)

2. **The Graph of Secant**

   (a) Write $\sec x$ in terms of $\sin x$ and/or $\cos x$.

   Without graphing, find the zeros and vertical asymptotes of $\sec x$. Explain your reasoning.

   Without graphing, find the values of x between 0 and 4π for which $\sec x = 1$ and $\sec x = -1$. Explain your reasoning.

   (b) Plot $\sec x$ with *Mathematica*, sketch a graph showing two full periods, and give an abbreviated analysis of the graph. (Discuss the domain, range, symmetries (including periodicity, with period), and horizontal/vertical asymptotes.)

3. **The Graph of Cosecant**

   (a) Write $\csc x$ in terms of $\sin x$ and/or $\cos x$.

   Without graphing, find the zeros and vertical asymptotes of $\csc x$. Explain your reasoning.

   Without graphing, find the values of x between 0 and 4π for which $\csc x = 1$ and $\csc x = -1$. Explain your reasoning.

   (b) Plot $\csc x$ with *Mathematica*, sketch a graph showing two full periods, and give an abbreviated analysis of the graph. (Discuss the domain, range, symmetries (including periodicity and period), and horizontal/vertical asymptotes.)

4. Find solutions to the following equations (in the given intervals) graphically. Include well-labeled sketches of the relevant graphs.

   (a) $\tan x = 1.3, \quad 0 \leq x \leq \frac{\pi}{2}$

   (b) $\sec x = 2.4, \quad 0 \leq x \leq \frac{\pi}{2}$

   (c) $\cot x = -0.6, \quad \frac{3\pi}{2} \leq x \leq 2\pi$

   (d) $\csc x = -1.5, \quad \pi \leq x \leq \frac{3\pi}{2}$