Full name(s): ________________________ .

Questions

1. Sketch a graph of $\tan(x)$, $\tan^2(x)$, $\sec(x)$, and $\cos(2x)$, $\cos^{-1}(x)$, $\tan^{-1}(x)$, and $\cot^{-1}(x)$. Try to do this without looking them up, just thinking about the graphs for $\sin(x)$ and $\cos(x)$.

2. Rewrite the following expressions in terms of $\sin(x)$ and $\cos(x)$:

   - $\frac{\sec^3(x)}{\tan(2x)}$
   - $\csc(2x+\pi)\sin(x)$
   - $\tan(x/2)+\cot(x/2)$

   Evaluate each of the following expressions:

   - $\tan(\sin^{-1}(x))$
   - $\csc(\sec^{-1}(x))$
   - $\cos(\csc^{-1}(x))$

3. Prove that $\sec^2(x)-\tan^2(x)=1$.

4. Graph the following functions, labeling horizontal and vertical asymptotes and holes:

   - $f(x)=\frac{x-2}{x^2-4}$
   - $f(x)=\frac{1}{x^3-4x}$
   - $f(x)=\frac{3x+1}{x-2}$
   - $f(x)=\frac{x^2+2}{x-1}$
   - $f(x)=\frac{x^2+3}{x^2-9}$
   - $f(x)=\frac{1}{x^3-3x^2+3x-1}$

5. Write the following functions over a single fraction bar and then graph them

   - $f(x)=\frac{1}{x-2}-\frac{x}{x+2}$
   - $f(x)=\frac{5x+4}{5x}-\frac{5x-x^2}{x+2}$

6. **Challenge** Find an inverse for $f(x)=\sin(x)+\cos(x)$. What are the domain and range of this inverse?