Full name(s): ________________________ .

Questions

1. Compute derivative of $\tan(x)$ by writing it in terms of $\sin(x)$ and $\cos(x)$ and using the quotient rule. Simplify.
2. Do the same for $\sec(x)$, $\csc(x)$, and $\cot(x)$.
3. Use the derivative rule for inverse functions to compute:
   - $\frac{d}{dx}\cos^{-1}(x)$.
   - $\frac{d}{dx}\tan^{-1}(x)$.
   - $\frac{d}{dx}\sec^{-1}(x)$.
   - $\frac{d}{dx}\csc^{-1}(x)$.
   - $\frac{d}{dx}\cot^{-1}(x)$.
4. Compute derivatives of:
   - $\sin(\ln(x))$
   - $\ln(1+\sin(x))$
   - $\tan^{-1}(\sqrt{x^2+1})$
   - $\ln\frac{2^x-1}{2^x+1}$
   - $\sin^{-1}(\frac{2}{\pi}\frac{x^2}{x^2+1})$
5. Compute the second derivatives of:
   - $f(x)=\frac{1}{x}$.
   - $f(x)=\sin(x)$
   - $f(x)=e^4x$
   - $f(x)=\frac{x+1}{x-1}$

   .
6. A ball is moving with trajectory $x(t)=10t$ and $y(t)=8t-5t^2$. What is the ball's vertical acceleration?
7. A spherical balloon is being inflated so that it's surface area is increasing at 1 cm^2/s. How fast is its volume increasing?