1.) (20 pts.) For \( f(x) = \frac{3 - x^2}{3 + x^2} \), find \( f'(x) \) in two ways:

a.) use the Quotient Rule;

b.) rewrite as \( f(x) = (3 - x^2)(3 + x^2)^{-1} \) and use the Product Rule.

Do your answers match?
2.) (10 pts.) Compute the limit \( \lim_{x \to \infty} \frac{x}{e^x} \). Show all necessary steps.

3.) (10 pts.) What is the tangent line approximation to \( e^x \) near \( x = 0 \)?
4.) (10 pts.) Find the slope of the tangent to the curve \( x^3 + 5x^2y + 2y^2 = 4y + 11 \) at (1, 2).

5.) (10 pts.) Use the graphs of \( f \) and \( g \) to describe the motion of a particle whose position at time \( t \) is given by \( x = f(t) \), \( y = g(t) \).
6.) (10 pts.) If \( f(2) = 5, \ f'(2) = 6, \ g(2) = 7, \) and \( g'(2) = 8, \) find
   a.) \( h'(2) \) if \( h(x) = f(x) \cdot g(x); \)

   b.) \( k'(2) \) if \( k(x) = \frac{f(x)}{g(x)}; \)

7.) (10 pts.) Compute the 300th derivative of \( y = \sin x. \)
8.) (10 pts.) Compute $h'(z)$ if $h(z) = \left( \frac{b}{a + z^2} \right)^4$. Note: $z$ is the variable; $a$ and $b$ are constants.

9.) (10 pts.) Compute $f'(t)$ if $f(t) = \ln(\ln t) + \ln(\ln 2)$.

**BONUS:** Use the chain rule to compute $\frac{d}{dx}(\arcsin x)$. (You may work on the back of the page.)