1. Calculate the derivatives of the following functions using any method. (10 points)

   a. \( y = (x^3 + 2x + \pi)^7 \)

   b. \( y = \frac{x + \sqrt{x} + \sqrt[4]{2x^3}}{x^3} \)

   c. \( y = \sin(\sin(\pi x + 2)) \)
2. Calculate the derivatives of the following functions using any method. (10 points)

   a. \( y = e^{-3x^2 + 4x - 1} \)

   b. \( y = x \ln(x) \)

   c. \( y = 3^{2x} \cos(x) \)

3. Find the derivative of \( f(x) = \frac{1}{x} \) using the limit definition of the derivative. (No points will be given if you do not use the limit definition.) (5 points)

4. Using the derivatives \( \frac{d}{dx} \sin(x) = \cos(x) \) and \( \frac{d}{dx} \cos(x) = -\sin(x) \), show that the derivative of \( \tan(x) \) is \( \sec^2(x) \). (5 points)
5. Consider the curve with equation \( xy^2 = 9 \cos y \). Find \( \frac{dy}{dx} \) using implicit differentiation and then find the equation of the tangent line through the point \( (0, \frac{\pi}{2}) \). (10 points)

6. The volume \( V \) of a sphere is \( V = \frac{4}{3} \pi r^3 \). If the radius of a sphere is increasing at the rate of 8 inches per minute when the radius is 5 inches, how fast is the volume of the balloon increasing? (5 points)