1. Evaluate the following problems: (8% each)
   a. \( \int \frac{1}{\sin x - \tan x} \, dx \);
   b. \( \int_0^{\pi/2} e^{\sin x} \cos x \, dx \);
   c. \( \lim_{x \to \infty} \left( x - \sqrt{x^2 + x} \right) \);
   d. \( \lim_{n \to \infty} \sum_{i=1}^{n} 2 \left( \frac{i+1}{n} \right)^2 \);
   e. Differentiate \( f(x) = e^2 + \frac{e^{-2x}}{x^3} \).

2. Find the volume of the solid formed by revolving the region bounded by \( y = x^2 + 1 \), \( y = 0 \), \( x = 0 \), and \( x = 1 \) about the y-axis. (12%) 

3. Find the slope of the curve \( x^3 + xy + y^2 = 4 - x \) when \( x = 1 \). (12%) 

4. Find the arc length of the graph of \( (y - 1)^2 = x^2 \) over the interval \( x = [0, 8] \). (12%) 

5. Find the power series centered at \( x = 0 \) for \( f(x) = \frac{5x - 1}{x^2 - x - 2} \). (12%) 

6. Find the area of the region bounded by \( y = x^3 - 2x^2 + x - 1 \) and \( y = -x^2 + 3x - 1 \). (12%)