1. Short Answer and Examples...

2. Set up (but do not evaluate) the integral to compute the length of the curve given by \( y^2 = 4x \) for \( 0 \leq y \leq 2 \).

3. Set up (but do not evaluate) the integral to compute the surface area of the surface obtained by rotating the given curve about the given axis.
   
   (a) \( y = \sqrt{x} \) for \( 4 \leq x \leq 9 \) about \( x \)-axis
   
   (b) \( y = x^3 + x \) for \( 1 \leq x \leq 3 \) about \( y \)-axis

4. Compute the following integrals. If the integral diverges, prove it.
   
   (a) \( \int_{2}^{3} \frac{x^2 + 2x - 1}{x^3 - x} \, dx \)
   
   (b) \( \int_{1}^{3} \frac{1}{x - 2} \, dx \)

5. Consider the sequence \( \left\{ 2, \frac{3}{2}, \frac{9}{8}, \frac{27}{32}, \ldots \right\} \).
   
   (a) Give an explicit definition of the sequence.
   
   (b) Give a recursive definition of the sequence.

6. Find the sum of the series \( \sum_{n=1}^{\infty} \frac{(-2)^n}{4 \cdot 3^{n+1}} \).

7. Determine whether the following series converge or diverge. Justify your answer.
   
   (a) \( \sum_{n=1}^{\infty} \frac{3^{2n}}{4^{n-1}} \)
   
   (b) \( \sum_{n=1}^{\infty} \frac{n}{2n + 1} \)
   
   (c) \( \sum_{n=1}^{\infty} \frac{\ln n}{n^2} \)