1. The curve \( y = \frac{\ln x}{x}, x \geq 1 \), is revolved about the \( x \)-axis. Is the volume of the resulting solid finite or infinite?
2. The same question about the area of the surface of revolution.
3. Prove that the integral \( \int_{-\infty}^{\infty} \frac{1}{x^2 + 2x + 2} \, dx \) converges and find its value.
4. Use the limit comparison test to show that the integral \( \int_{1}^{\infty} \frac{x^3 + 3x + 5}{x^4 \ln x + \sqrt{x}} \, dx \) diverges.
5. Use an appropriate test to find out whether the series \( \sum_{n=1}^{\infty} \frac{n^2 - 5n + 3}{n^3 \ln^2 n - \sqrt[3]{n}} \) converges or diverges.
6. Use the Ratio test to find out whether the series \( \sum_{n=0}^{\infty} \frac{n! e^n}{(2n)!} \) converges or diverges.
7. Find the radius of convergence of the power series \( \sum_{n=2}^{\infty} \frac{x^n}{n \ln n} \). What happens at the ends of the interval of convergence.
8. Find the value of \( \arcsin(0.499) \) with accuracy 0.0000001 using an appropriate Taylor series.
9. Write the first five terms of the Maclaurin series of the function \( f(x) = \cos(\sin x) \).
10. Estimate the value of \( \int_{0}^{\pi} \frac{\sin x}{x} \, dx \) with accuracy 0.0000001 using an appropriate Taylor series.