1. Use the ratio test to decide whether \( \sum_{k=1}^{\infty} \frac{(9/5)^k}{e^{k/2}} \) converges. Show all your work.

2. Does \( \sum_{k=2}^{\infty} \frac{(-1)^k}{k \ln k} \) converge absolutely? You will find the integral test useful; it’s a fact that \( \int \frac{1}{x \ln x} \, dx = \ln(\ln(x)) \).

Show all your work and use correct notation in any evaluations of improper integrals.

3. Does \( \sum_{k=2}^{\infty} \frac{(-1)^k}{k \ln k} \) converge conditionally? Explain why or why not.

4. If the series in (3) does converge to some number \( S \), find the partial sum \( \sum_{k=2}^{50} \frac{(-1)^k}{k \ln k} \), and an upper bound on how far away this partial sum is from \( S \). If the series in (3) diverges, find how many terms you need to add to obtain a partial sum which is bigger than 50.