1. Determine the number of intervals required to use the Trapezoidal Rule to estimate \( \int_1^2 \sin(x^2) \, dx \) to 6 decimal places (error less than \( 5 \times 10^{-7} \)).

2. Repeat the previous question using Simpson’s Rule.

3. Determine which of the following integrals are improper. Explain your answers.
   
   (a) \( \int_1^2 \frac{dx}{2x - 1} \)
   
   (b) \( \int_0^1 \frac{dx}{2x - 1} \)
   
   (c) \( \int_{-\infty}^{\infty} \frac{\sin(x)}{1 + x^2} \, dx \)
   
   (d) \( \int_1^2 \ln(x - 1) \, dx \)

4. If possible, give the exact value of the improper integral \( \int_0^\infty \frac{e^x}{4e^{2x} + 9} \, dx \).

5. If possible, give the exact value of the improper integral \( \int_0^1 \ln(x) \, dx \).