1. Consider the integral
\[ \int_{0}^{1} \cos(3x^2 + 1) \, dx. \]
(a) Compute an approximation to the integral using the Trapezoid rule with \( n = 6 \) subintervals.
(b) Determine what \( n \) is needed to assure the error using the trapezoid rule is at most 0.0001.
(c) Determine what \( n \) is needed to assure the error using Simpson’s rule is at most 0.0001.

2. Compute the value of the following integrals, or determine that they are divergent.
(a) \( \int_{1}^{\infty} x^{-5/2} \, dx \)
(b) \( \int_{0}^{\infty} \frac{e^x}{e^{2x} + 3} \, dx \)
(c) \( \int_{0}^{1} \frac{\ln(x)}{\sqrt{x}} \, dx \)

3. Determine if the following integrals are convergent or divergent, but do not try to compute their values.
(a) \( \int_{1}^{\infty} \frac{2 + e^{-x}}{x} \, dx \)
(b) \( \int_{0}^{1} \frac{1}{x^2 + \sqrt{x}} \, dx \)

4. Compute the area of the region enclosed by the curves \( y = (x - 1)^2 \) and \( y = x + 1 \).

5. Compute the area of the region with \( x > 0 \) and enclosed by the curves \( y = 1/x \), \( y = x \), and \( y = 4x \).