Additional Questions for Homework on Section 8.6

A. Approximate the following integrals using (i) the Midpoint Rule with \( n = 4 \), (ii) the Trapezoid Rule with \( n = 4 \) and (iii) using Simpson Rule with \( n = 4 \).

(a) \( \int_{1}^{3} x^3 \, dx \)
(b) \( \int_{0}^{\pi} \sin x \, dx \)
(c) \( \int_{0}^{8} \frac{1}{1+x^3} \, dx \)

B. Approximate the following integral using (i) the Midpoint Rule with \( n = 6 \), (ii) the Trapezoid Rule with \( n = 6 \) and (iii) using Simpson Rule with \( n = 6 \).

(a) \( \int_{1}^{10} x^2 \, dx \)
(b) \( \int_{0}^{4} e^x \, dx \)
(c) \( \int_{-1}^{2} \frac{1}{1+x^2} \, dx \)

C. Recall the integral construction of the natural logarithm (i.e. \( \ln x = \int_{1}^{x} \frac{1}{t} \, dt \)).

(a) Using the Trapezoid Rule with \( n = 10 \) estimate \( \ln 2 \).
(b) Using Simpson’s Rule with \( n = 10 \), estimate \( \ln 2 \).