Please provide complete and well-written solutions to the following exercises.

Due May 1, at the beginning of class.

Assignment 5

Exercise 1. Compute the following integral

$$\int_3^5 (9 - x^2)dx.$$

Then, approximate this integral by computing the Trapezoid rule T_N, the Midpoint rule M_N, and Simpson's rule S_N for $N = 4$. Compute also the error bounds for these three integral approximations. Which approximation is the best?

Exercise 2. Compute the following integral

$$\int_0^4 x^3 dx.$$

Then, approximate this integral by computing the Trapezoid rule T_N, the Midpoint rule M_N, and Simpson's rule S_N for $N = 4$. Compute also the error bounds for these three integral approximations. Which approximation is the best?

Exercise 3. Find the arc length of $y = 2^{-4}x^4 + (1/2)x^{-2}$ over the interval $[1, 4]$. (Hint: write $1 + (y')^2$ as the square of something.)

Exercise 4. Using a comparison of integrals, show that the arc length of $y = x^{4/3}$ over $[1, 2]$ is greater than or equal to $5/3$.

Exercise 5. Compute the surface area of revolution about the x-axis over the interval $[0, 1]$ of the function

$$y = 2x + 1.$$

Exercise 6. Compute the surface area of revolution about the x-axis over the interval $[1, 2]$ of the function

$$y = \sqrt{9 - x^2}$$