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
\[ y = \sqrt{9 - x^2} \]