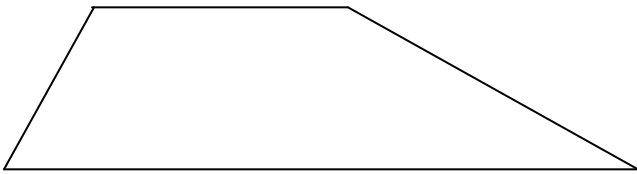


Section 4.6 - Numerical Integration

- Obj: - To approximate a definite integral using the Trapezoidal Rule.
- To analyze the errors in the Trapezoidal rule.

Area of a trapezoid

$$A =$$



1. Approximate the area of the region bounded by $f(x) = x^2 + 1$, $x = 0$, $x = 2$, and the x-axis using 4 trapezoids.

Error in the Trapezoidal Rule

$$|E| \leq \frac{(b-a)^3}{12n^2} (\max |f''(x)|)$$

interval $[a, b]$ using n trapezoids

2. Find the error in the approximation of $\int_0^2 (x^2 + 1) dx$ using 4 trapezoids.

$$f' =$$

$$f'' =$$

Maximum of $|f''(x)|$ in the interval $[0, 2]$

$$|E| \leq \frac{(b-a)^3}{12n^2} (\max |f''(x)|)$$

$$|E| \leq$$

3. Let the area of the region in problem 1 above be found (approximated) using inscribed rectangles, circumscribed rectangles, trapezoids, and definite integral. Order the answers from least to greatest.
4. Given $f(x)$ in the first quadrant with $f'(x) > 0$, $f''(x) < 0$ in the interval $[a,b]$. If the area between the curve and the x-axis was found using the above methods, order the answers from least to greatest.