The solutions of $ax^2 + bx + c = 0$ are $x = \left( -b \pm \sqrt{b^2 - 4ac} \right) / (2a)$.

If a rational function is proper and has \((ax + b)^r\) in the denominator, then the sum

\[
\frac{A_1}{ax + b} + \frac{A_2}{(ax + b)^2} + \cdots + \frac{A_r}{(ax + b)^r}
\]

is part of the partial fraction expansion. If \(ax^2 + bx + c\) is irreducible and a proper rational function has \((ax^2 + bx + c)^r\) in the denominator, then

\[
\frac{A_1x + B_1}{ax^2 + bx + c} + \frac{A_2x + B_2}{(ax^2 + bx + c)^2} + \cdots + \frac{A_rx + B_r}{(ax^2 + bx + c)^r}
\]

is part of the partial fraction expansion.

Midpoint Rule: \(\Delta x[f(x_1) + f(x_2) + \cdots + f(x_n)]\) where \(x_i = (x_{i-1} + x_i)/2\). Trapezoidal Rule: \(\frac{\Delta x}{2}[f(x_0) + 2f(x_1) + 2f(x_2) + \cdots + 2f(x_{n-2}) + 2f(x_{n-1}) + f(x_n)]\). Simpson’s Rule: \(\frac{\Delta x}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + 2f(x_4) + \cdots + 2f(x_{n-2}) + 4f(x_{n-1}) + f(x_n)]\).

If \(E_T\) and \(E_M\) are the errors for the Trapezoidal Rule and Midpoint Rule, respectively, then \(|E_T| \leq \frac{K_2(b - a)^3}{12n^2}\) and \(|E_M| \leq \frac{K_2(b - a)^3}{24n^2}\), where \(|f''(x)| \leq K_2\) for \(a \leq x \leq b\).

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| Error in Simpson’s Rule | \(\leq \frac{K_4(b - a)^5}{180n^4}\) where \(|f^{(4)}(x)| \leq K_4\) for \(a \leq x \leq b\).|

| length | \(= \int_a^b \sqrt{1 + [f'(x)]^2} \, dx\) |
| surface area | \(= \int_a^b 2\pi f(x) \sqrt{1 + [f'(x)]^2} \, dx\) |