

Math 181

Trapezoidal Rule

$$\int_a^b f(x)dx \approx \frac{b-a}{2n} [f(x_0) + 2f(x_1) + 2f(x_2) + \dots + 2f(x_{n-1}) + f(x_n)]$$
$$a = x_0 < x_1 < x_2 < \dots < x_{n-1} < x_n = b$$

Simpson's Rule

$$\int_a^b f(x)dx \approx \frac{b-a}{3n} [f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + \dots + 4f(x_{n-1}) + f(x_n)]$$

Error Bounds

$$|E_T| \leq \frac{|f''(x)|(b-a)^3}{12n^2}$$
$$|E_S| \leq \frac{|f^{(4)}(x)|(b-a)^5}{180n^4}$$