Section 7.7

Class Exercise 1. Find $\int e^{x^2}\ dx$.

Midpoint Rule

$$\int_a^b f(x)\ dx \approx M_n = \triangle\ x\ [f(\bar{x}_1) + f(\bar{x}_2) + ... + f(\bar{x}_n)],$$

where $\triangle\ x = \frac{b-a}{n}$ and $\bar{x}_i = \frac{1}{2}(x_{i-1} + x_i) =$ midpoint of $[x_{i-1}, x_i]$.

Exercise 1. Evaluate $\int_0^1 e^{x^2}\ dx$ using the Midpoint Rule $(n = 4)$.

Class Exercise 2. Use the Midpoint Rule with $n = 4$ to find the approximate value of the integral:
(a) $\int_0^2 x\ dx$
(b) $\int_0^2 x^2\ dx$
(c) $\int_0^2 x^3\ dx$
(d) $\int_1^2 \frac{1}{x}\ dx$
(e) $\int_0^4 \sqrt{x}\ dx$
(f) $\int_0^\pi \sin\ x\ dx$.

Trapezoidal Rule: To approximate $\int_a^b f(x)\ dx$, use

$$T = \frac{\triangle x}{2}(y_0 + 2y_1 + 2y_2 + ... + 2y_{n-1} + y_n).$$

The y's are the values of f at the partition points

$$x_0 = a,\ x_1 = a + \triangle x,\ x_2 = a + 2\triangle x, ..., x_{n-1} = a + (n-1)\triangle x,\ x_n = \text{b},$$

where $\triangle x = (b - a)/n$.

Exercise 2. Use the Trapezoidal Rule with $n = 4$ to evaluate $\int_1^2 \frac{1}{x}\ dx$.

Class Exercise 3. Use the Trapezoidal Rule with $n = 4$ to find the approximate value of the integral:
(a) $\int_0^2 x\ dx$
(b) $\int_0^2 x^2\ dx$
(c) $\int_0^4 \sqrt{x}\ dx$
(d) $\int_0^\pi \sin\ x\ dx$.

Homework: 1, 5(a), 7-17 odd (a),(b)