

Riemann sum approximations

- ✓ For n equal subintervals on $[a, b]$: $\Delta x = \frac{b-a}{n}$

← Left Riemann sum

- ✓ $L_n = \Delta x [f(x_0) + f(x_1) + \cdots + f(x_{n-1})]$
- ✓ Uses the left endpoints, leaving out the rightmost

→ Right Riemann sum

- ✓ $R_n = \Delta x [f(x_1) + f(x_2) + \cdots + f(x_n)]$
- ✓ Uses the right endpoints, leaving out the leftmost

🎯 Midpoint Riemann sum

- ✓ $M_n = \Delta x [f(m_1) + f(m_2) + \cdots + f(m_n)]$
- ✓ where $m_k = \frac{x_{k-1} + x_k}{2}$

Trapezoidal rule

- ✓ $T_n = \frac{\Delta x}{2} [f(x_0) + 2f(x_1) + \cdots + 2f(x_{n-1}) + f(x_n)]$

∞ Limit definition of the definite integral

- ✓ $\int_a^b f(x) dx = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(x_k) \Delta x$
- ✓ where $x_k = a + k\Delta x$