TI–83 Lab 13 For Mathematics 223

Topics: Sum of rectangular areas

Approximating area using sum of rectangular areas. Calculate area of triangle under $f(x) = 3x$, $0 \leq x \leq 5$, using the rectangular approximation method where $n = 50$, so $\Delta x = 0.1$, and using both left endpoint and midpoint rules.

- *Left endpoint rule*

  Sum of areas of all 50 rectangles is

  $$
  \begin{aligned}
  &= f(x_1)\Delta x + f(x_2)\Delta x + f(x_3)\Delta x + \cdots + f(x_{50})\Delta x \\
  &= \Delta x \left[f(x_1) + f(x_2) + f(x_3) + \cdots + f(x_{50}) \right] \\
  &= 0.1 \left[f(0) + f(0.1) + f(0.2) + \cdots + f(4.9) \right] \\
  &= 0.1 \left[3(0) + 3(0.1) + 3(0.2) + \cdots + 3(4.9) \right] = 36.75
  \end{aligned}
  $$

  2nd LIST OPS seq 3X, X, 0, 4.9, 0.1) STO 2nd L_1 ENTER,
  then 2nd LIST MATH sum ENTER 2nd L_1) $\times$ 0.1 ENTER

- *Midpoint rule*

  Sum of areas of all 50 rectangles is

  $$
  \begin{aligned}
  &= \Delta x \left[f(x_1) + f(x_2) + f(x_3) + \cdots + f(x_{50}) \right] \\
  &= 0.1 \left[f(0.05) + f(0.15) + f(0.25) + \cdots + f(4.95) \right] \\
  &= 0.1 \left[3(0.05) + 3(0.15) + 3(0.25) + \cdots + 3(4.95) \right] = 37.5
  \end{aligned}
  $$

  2nd LIST OPS seq 3X, X, 0.05, 4.95, 0.1) STO 2nd L_2 ENTER,
  then 2nd LIST MATH sum ENTER 2nd L_2) $\times$ 0.1 ENTER