Lab 3: Defining and using functions

The area under a given function $f(x)$ in the range $[x_a, x_b]$ can be approximated with rectangles as shown in Figure 1. Write Octave script that will calculate the exact and approximated values of this area

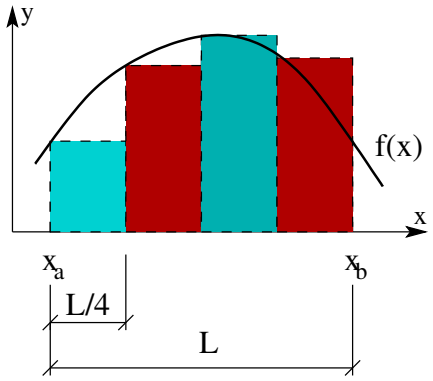

Figure 1: Approximation of area under a function f(x).

assuming the following:

- Function $f(x)$ is given in the general form:

$$f(x) = ax^2 + bx + c$$

  with coefficients a, b, c.

- The area S under given function f in the range $[x_a, x_b]$ is given by the expression:

$$S(x_a, x_b) = \frac{a}{3}(x_b^3 - x_a^3) + \frac{b}{2}(x_b^2 - x_a^2) + c(x_b - x_a)$$

- Assume that the area S is approximated with 4 rectangles of equal width.

- **Important: In your script implement 3 functions:**

  i) function which calculates values $f(x)$,

  ii) function which calculates approximated value of $S(x_a, x_b)$

  iii) function which calculates exact value of $S(x_a, x_b)$.