% Trapezoidal Rule

syms x; % Declare symbolic variable

fun = input('Enter the function f(x) (e.g., x^2+2\*x): ', 's'); % Input function as a string

f = str2func(['@(x) ' fun]); % Convert the input string to a function handle

% Input integration limits and number of partitions

x\_0 = input('Enter the lower limit a: '); % Lower limit of integration

x\_n = input('Enter the upper limit b: '); % Upper limit of integration

n = input('Enter the number of partitions n: '); % Number of partitions

% Calculate step size

h = (x\_n - x\_0) / n;

% Generate x and y values

x\_values = x\_0:h:x\_n; % Generate x values

y\_values = arrayfun(f, x\_values); % Evaluate f(x) at each x value

% Apply the Trapezoidal Rule using a for loop

A = y\_values(1) + y\_values(end); % Add first and last terms

% Add twice the sum of the middle terms using a for loop

for i = 2:n

A = A + 2 \* y\_values(i);

end

A = (h / 2) \* A; % Final area computation

% Display the result

disp("The result is :")

disp(A)