

## Lab 5 –

**Aim:** Numerical solution of integrals using Trapezoidal method

### **Brief Theory:**

### **Numerical Procedure:**

1. Start
2. Define and Declare function
3. Input initial boundary value, final boundary value and length of interval
4. Calculate number of strips,  $n = (\text{final boundary value} - \text{initial boundary value}) / \text{length of interval}$
5. Perform following operation in loop
  - $x[i] = x_0 + i * h$
  - $y[i] = f(x[i])$
  - print  $y[i]$Initialize  $se=0, s0=0$
6. Do the following using loop
  - If  $i \% 2 = 0$
  - $So = s0 + y[i]$
  - Otherwise
  - $Se = se + y[i]$ $ans = h/3 * (y[0] + y[n] + 4 * so + 2 * se)$
7. print the ans
8. stop

**Examples:** i. Use Trapezoidal rule with 6 subintervals to approximate  $\int_0^2 dx / (16 + x^2)$ .

ii. Use multiple segment Trapezoidal rule to find the area under the curve

$f(x) = 300x / (1 + e^x)$  from  $x=0$  to  $x=10$ .

iii. Use Trapezoidal rule with  $n=4$ , approximate the value of the integral  $\int_0^4 \sqrt{x} dx$ .