**2.Intregation**

Problem Statement:

Write a program that finds an approximate value of a definite integral.

Let l be the left and r the right boundary for the integral. Also let h be the step size.

The idea is to break the interval [l, r] into sub-intervals

[l, l + h], [l + h, l + 2h], [l + 2h, l + 3h], ..., [r − h, r].

Assume that r − l is an integral multiple of h.

Your program evaluates the function to be integrated at the center of each

interval, multiplies these values by the width h and computes the sum.

• Input example :

(i) 1 (ii) 4

5 9

• Output example :

(i) 597.330 (ii) 5984.146459

Proposed C Code:

/\* ------- main.c ------- \*/

#include <stdio.h>

int main()

{

    double h = 0.00001; *// taking a small value for h*

    double sum = 0.0;

    printf("Enter range: ");

    double l, r;

    scanf("%lf %lf", &l, &r);

*/\* Setting the Interval\*/*

    double x = l; *// leftmost point*

    double y = l + h; *// just next to the leftmost point*

    int op = (int)((r - l) / h);

    for (int i = 1; i <= op; i++)

    {

        double x = (x + y) / 2; *// average of points*

        double fun = 4 \* x \* x \* x - 2 \* x \* x + 3 \* x + 5; *// f(x)=4x^3-2x^2+3x+5*

        sum += fun;

*// moving to next points*

        x += h;

        y += h;

    }

    sum \*= h;

    printf("%.2lf", sum);

    return 0;

}

/\* ---------------------- \*/

Conclusion:

The proposed algorithm has a runtime of O(n), where n is (r-l)/h.

Limitations and assumptions for this algorithm include:

1.Here we are assuming that value of h is 0.0001. Lesser the value of h more accurate result we will get.

2.We are assuming the function used in this program is f(x)=4x3-2x2+3x+5.