



Higher Institute of Engineering & Technology, El-Beheira

Computer Engineering Department

First assignment in numerical analysis

Under supervision of Dr.Mahmoud Gamal

**Team**

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**ID**

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## Source code in python: -

```
1 print('Project for "Numerical analysis". under the supervision of Dr
   . Mahmoud Gamal')
2 print('by:')
3 print('\t\tMohamed Yosry ElZarka 19100')
4 print('\t\tYoussef Mohamed Elsheheimy 19124')
5 print('\t\tOmar Abd Al-Halim Khalil 19138\n')

6 print("This is a program to calculate the numerical integration o
   f a function using the trapezoidal rule.\n")
7 while True:
8     n=int( input("enter the number of dots: ") )
9     s=float( input("enter the start of the integration: ") )
10    e=float( input("enter the end of the integration: ") )
11    h=(e-s)/(n-1)
12    X=[]
13    fX=[]
14    for i in range(0,n):
15        X.append( float( s+h*i ) )

16    print("\nyou can use parentheses () in addition to the following
       mathematical operators:")
17    print("(+ Add), (- Subtract), (* Multiply), (/ Divide), (% Modulu
       s), (// Floor division), (** Exponent)\n")
18    x = 1
19    stri=str(input("enter the equation: f(x)= "))

20    sum=0
21    for i in range(0,n):
22        x=X[i]
23        fX.append( eval(stri) )
24        sum+=fX[i]
25    sum= sum - 0.5*fX[0] - 0.5*fX[n-1]
26    print('\nh=',h)
27    print("x=",X)
28    print("f(x)=",fX)
29    print("")
30    print("from",s,"to",e, "    ∫ f(x) dx= ∫",stri,"dx=",sum*h)
31    print('_____')
32    print('Try another integration.')
```

## The program

```
Project for "Numerical analysis". under the supervision of Dr. Mahmoud Gamal.
by:
    Mohamed Yosry ElZarka 19100.
    Youssef Mohamed Elsheheimy 19124.
    Omar Abd Al-Halim Khalil 19138.

This is a program to calculate the numerical integration of a function using the trapezoidal rule.

enter the number of dots: 5
enter the start of the integration: 0
enter the end of the integration: 1

you can use parentheses ( ) in addition to the following mathematical operators:
(+ Add), (- Subtract), (* Multiply), (/ Divide), (% Modulus), (// Floor division), (** Exponent).

enter the equation: f(x)= x**4

h= 0.25
x= [0.0, 0.25, 0.5, 0.75, 1.0]
f(x)= [0.0, 0.00390625, 0.0625, 0.31640625, 1.0]

from 0.0 to 1.0    ∫ f(x) dx= ∫ x**4 dx= 0.220703125

Try another integration.
enter the number of dots:
```

## Source code in C++:-

```
1 #include<iostream>
2 #include<iomanip>
3 #include<fstream>
4
5 using namespace std;
6 int main()
7 {
8     cout<<"Project for 'Numerical Analysis' under the
supervision of Dr. Mahmoud Gamal."<<endl;
9     cout<<"by:\n\t\tMohamed Yosry ElZarka
19100.\n\t\tYoussef Mohamed ElSheheimy 19124.\n\t\tOmar Abd Al-Halim
Khalil    19138.\n";
10
11     fstream Xline, Yline;
12     Yline.open("Y.txt", ios::app);
13     Xline.open("X.txt", ios::app);
14
15     double x[1000] = { 0 }, fx[1000] = { 0 }, h = 0, res = 0;
16     int n;
17     cout<<"This is a program to calculate the numerical
integration of a function using the trapezoidal rule.\n";
18
19     cout << "Enter The Number of dots(n) : ";
20     cin >> n;
21
22     for (int i = 0; i < n; i++)
23     {
24         cout << "Enter value of x = ";
25         cin >> x[i];
26         Xline << x[i] << ",";
27         cout << "Enter value of F(x) at x of "<<x[i]<<" = ";
28         cin >> fx[i];
29         Yline << fx[i] << ",";
30         res += fx[i];
31         if (i)h += x[i] - x[i - 1];
32     }
```

```

33
34     h /= n - 1;
35
36     res -= fx[0] * 0.5;
37     res -= fx[n - 1] * 0.5;
38
39     ofstream out ("X.txt");
40     ofstream out1 ("Y.txt");
41
42
43     for(int i=0;i<n+1;i++)
44         cout<<"-----";
45         cout<<endl;
46         cout<<setw(10)<<left<<"x"<<"|";
47     int counter=0;
48     for(counter =0 ; counter < n ; counter++)
49     {
50         out<<x[counter];
51         cout<<setw(10)<<left<<x[counter]<<"|";
52     }
53     cout<<endl;
54     for(int i=0;i<n+1;i++)
55         cout<<"-----";
56         cout<<endl;
57         cout<<setw(10)<<left<<"F(x)"<<"|";
58     for(counter =0 ; counter < n ; counter++)
59     {
60         out1<<fx[counter];
61         cout<<setw(10)<<left<<fx[counter]<<"|";
62     }
63     cout<<endl;
64     for(int i=0;i<n+1;i++)
65         cout<<"-----";
66         cout<<endl;
67
68     cout<< endl<<"Trapezoidal Rule sum = " <<res * h;
69     return 0;
70 }

```

## The program in C++:-

```

Project for 'Numerical Analysis' under the supervision of Dr. Mahmoud Gamal.
by:
    Mohamed Yosry ELZarka      19100.
    Youssef Mohamed ElSheheimy 19124.
    Omar Abd Al-Halim Khalil   19138.
This is a program to calculate the numerical integration of a function using the trapezoidal rule.
Enter The Number of dots(n) : 5
Enter value of x = 0
Enter value of F(x) at x of 0 = 0
Enter value of x = .25
Enter value of F(x) at x of 0.25 = .00390625
Enter value of x = .5
Enter value of F(x) at x of 0.5 = .0625
Enter value of x = .75
Enter value of F(x) at x of 0.75 = .31640625
Enter value of x = 1
Enter value of F(x) at x of 1 = 1
-----
x      |0      |0.25   |0.5    |0.75   |1      |
-----
F(x)   |0      |0.00390625|0.0625 |0.316406 |1      |
-----
Trapezoidal Rule sum = 0.220703
C:\Users\Youssef Elsheheimy\Desktop\NA\Debug\NA.exe (process 2552) exited with code 0.
To automatically close the console when debugging stops, enable Tools->Options->Debugging->Automatically close the console when debugging stops.
Press any key to close this window . . .

```