

▼ Numerical Methods for Data Science - (SC602)

ASSIGNMENT - 02

ID - 202218061

NAME -JATAN SAHU

+ Code

+ Text

1. Write code for Newton's divided-difference interpolation method for linear , quadratic and general form. data points at $x_0 = 1$, $x_1 = 4$, $x_2 = 6$ and $x_3 = 5$ Were used to estimate $\ln 2$ with a parabola.

```

1 def Ninterpolation():
2     X=list(map(float,input("Enter values of X in list formatted seprated by spaces :").split(" ")))
3     Y=list(map(float,input("Enter values of Y in list formatted seprated by spaces :").split(" ")))
4
5     #Checking if length of X and Y are equal or not
6     while len(X)!=len(Y):
7         print("Type correct values of X and Y should be equal ")
8         X=list(map(float,input("Enter values of X in list formatted seprated by spaces :").split(" ")))
9         Y=list(map(float,input("Enter values of Y in list formatted seprated by spaces :").split(" ")))
10
11     x=float(input("Enter value for estimation :"))
12
13     #Making Newtons divided difference table
14     #Initialize m*n empty matrix
15     m=len(X)
16     n=len(X)+1
17     mat=[]
18     for i in range(m):
19         a=[]
20         for j in range(n):
21             a.append(None)
22         mat.append(a)
23
24     #Filling the values of X and Y in column 1 and 2
25     for i in range(m):
26         mat[i][0]=X[i]
27         mat[i][1]=Y[i]
28
29     #Calculating other columns
30     for i in range(2,n):
31         for j in range(0,n-i):
32             mat[j][i]=(mat[j+1][i-1] - mat[j][i-1])/(mat[i+j-1][0] - mat[j][0])
33
34     #Putting values in formula f(x) = y + (x-x0)y' +(x-x0)(x-x1)y'' +...
35     e=0
36     c=1
37     for i in range(1,n):
38         e = e + (mat[0][i])*c
39         c = c*(x - X[i-1])
40
41     #printing answer
42     print(f"\nEstimated value of f({x}) is {e}")
43
44
45

```

▼ linear interpolation

```

1 Ninterpolation()

Enter values of X in list formatted seprated by spaces :1 4
Enter values of Y in list formatted seprated by spaces :0 1.38
Enter value for estimation :2

Estimated value of f(2.0) is 0.45999999999999996

```

▼ Quadratic Interpolation

```

1 Ninterpolation()
2

```

```
Enter values of X in list formatted seprated by spaces :1 4 6
Enter values of Y in list formatted seprated by spaces :0 1.386294
Type correct values of X and Y should be equal
Enter values of X in list formatted seprated by spaces :1 4 6
Enter values of Y in list formatted seprated by spaces :0 1.386294 1.7917
Enter value for estimation :2
```

```
Estimated value of f(2.0) is 0.5658559999999999
```

▼ Cubic interpolation

```
1 Ninterpolation()
```

```
Enter values of X in list formatted seprated by spaces :1 4 6 5
Enter values of Y in list formatted seprated by spaces :0 1.386294 1.7917 1.6094
Enter value for estimation :2
```

```
Estimated value of f(2.0) is 0.6288079999999999
```

```
1
```