

## Newton's Forward Difference

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//Newton's Forward Difference
#include<iostream.h>
#include<conio.h>
#include<math.h>
void main()
{
    float x[10],y[10][10],sum,p,u,temp;
    int i,n,j,k=0,f,m;
    float fact(int);
    cout<<"\nhow many record you will be enter: ";
    cin>>n;
    for(i=0; i<n; i++)
    {
        cout<<"\n\nenter the value of x"<<i<<": ";
        cin>>x[i];
        cout<<"\n\nenter the value of f(x"<<i<<"): ";
        cin>>y[k][i];
    }

    cout<<"\n\nEnter X for finding f(x): ";
    cin>>p;

    for(i=1;i<n;i++)
    {
        for(j=0;j<n-i;j++)
        {
            y[i][j]=y[i-1][j+1]-y[i-1][j];
        }
    }
    cout<<"\n-----\n";
    cout<<"\n  x(i)\t  y(i)\t  y1(i)    y2(i)    y3(i)    y4(i)";
    cout<<"\n-----\n";
    for(i=0;i<n;i++)
    {
        cout<<"\n "<<x[i];
        for(j=0;j<n-i;j++)
        {
            cout<<" ";
            cout<<" "<<y[j][i];
        }
        cout<<"\n";
    }

    i=0;
    do
    {
        if(x[i]<p && p<x[i+1])
            k=1;
        else
            i++;
    }while(k != 1);
    f=i;
```

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u=(p-x[f])/(x[f+1]-x[f]);
cout<<"\n\n u = "<<u;

n=n-i+1;
sum=0;
for(i=0;i<n-1;i++)
{
    temp=1;
    for(j=0;j<i;j++)
    {
        temp = temp * (u - j);
    }
    m=fact(i);
    sum = sum + temp*(y[i][f]/m);
}
cout<<"\n\n f("<<p<<" ) ="<<sum;
getch();
}

```

```

float fact(int a)
{
    float fac = 1;

    if (a == 0)
        return (1);
    else
        fac = a * fact(a-1);

    return(fac);
}

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OUT PUT

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how many record you will be enter: 5

enter the value of x0: 2

enter the value of f(x0): 9

enter the value of x1: 2.25

enter the value of f(x1): 10.06

enter the value of x2: 2.5

enter the value of  $f(x_2)$ : 11.25

enter the value of  $x_3$ : 2.75

enter the value of  $f(x_3)$ : 12.56

enter the value of  $x_4$ : 3

enter the value of  $f(x_4)$ : 14

Enter X for finding  $f(x)$ : 2.35

$x(i)$	$y(i)$	$y_1(i)$	$y_2(i)$	$y_3(i)$	$y_4(i)$
2.000	9.000	1.060	0.130	-0.010	0.020
2.250	10.060	1.190	0.120	0.010	
2.500	11.250	1.310	0.130		
2.750	12.560	1.440			
3.000	14.000				

$u = 0.400$

$f(2.35) = 10.522240$

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