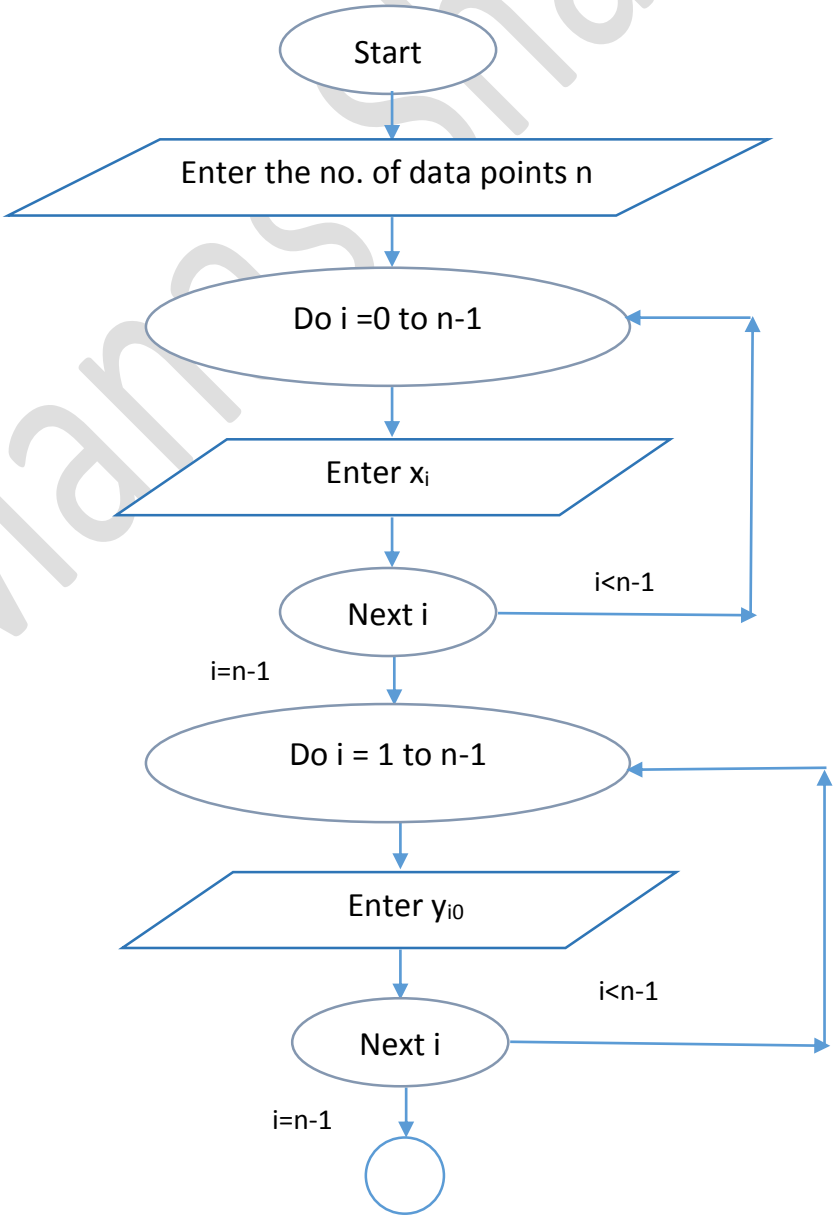
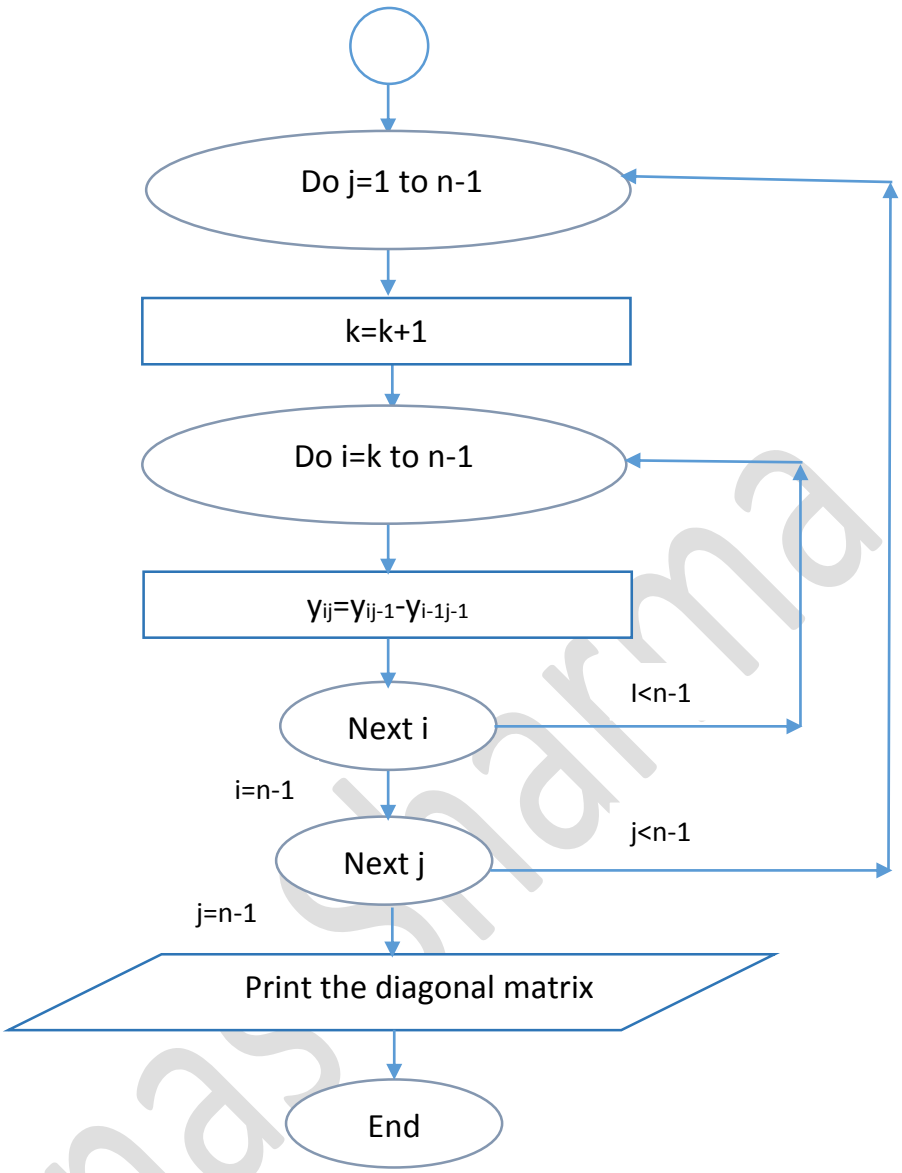
Aim: To find the Backward Difference Table from a given set of data values.

Algorithm:

1. Enter the no. of data values to be entered, 'n'.
2. Declare an array 'x' of size 'n' for the x-values and 'y_{nxn}' for y-values and the difference table.
3. For i=0 to n-1
   Enter x_i.
4. For i=0 to n-1
   Enter y_{i0}.
5. For j=1 to n-1
   Increment k by 1.
   For i=k to n-1
   $y_{ij}=y_{ij-1}-y_{i-1j-1}$.
6. Print the diagonal matrix.

Flow Chart:





Program:

```
//Backward Difference
#include<iostream>
#include<iomanip>
using namespace std;
int main()
{
    cout.precision(5);            //set precision
    cout.setf(ios::fixed);
    int i=0,j=0,n,k=0;
    cout<<"\nEnter the number of values to be entered.\n";
    cin>>n;
    double x[n], y[n][n];            //make an array for x values and an
nxn matrix for y and successive difference values, where y[n][0] is for the
the y values
    cout<<"\nEnter the values of x\n";
    for (i=0;i<n;i++)
        cin>>x[i];            //input x values
```

```
    cout<<"\nEnter the values of y\n";
    for (i=0;i<n;i++)
        cin>>y[i][0];            //input y values in the first column of y
matrix
    for (j=1;j<n;j++)            //loop to calculate the difference and
store them in the matrix
    {
        k++;
        for (i=k;i<n;i++)
        {
            y[i][j]=y[i][j-1]-y[i-1][j-1];
        }
    }
    cout<<"\n The Backward Difference Table is as follows: \n\n";
    cout<<"x"<<setw(10)<<"y"<<setw(10);
    for (i=1;i<n;i++)
        cout<<"y"<<i<<setw(10);        //formatting the output and creating
table headings
    cout<<"\n-------------------------------------------------------------
---------\n";
    for (i=0;i<n;i++)            //loop for printing the diagonal matrix on
the screen
    {
        cout<<x[i]<<setw(10);
        for (j=0;j<=i;j++)
        {
            cout<<y[i][j];
            cout<<setw(10);
        }
        cout<<"\n";

    }
return 0;
}
```

```
Enter the number of values to be entered.
5

Enter the values of x
0       5       10      15      20

Enter the values of y
0       3       14      69      228

 The Backward Difference Table is as follows:

x         y         y1         y2         y3         y4
-------------------------------------------------------------
0.00000   0.00000
5.00000   3.00000   3.00000
10.00000  14.00000  11.00000   8.00000
15.00000  69.00000  55.00000  44.00000  36.00000
20.00000 228.00000 159.00000 104.00000  60.00000  24.00000
```