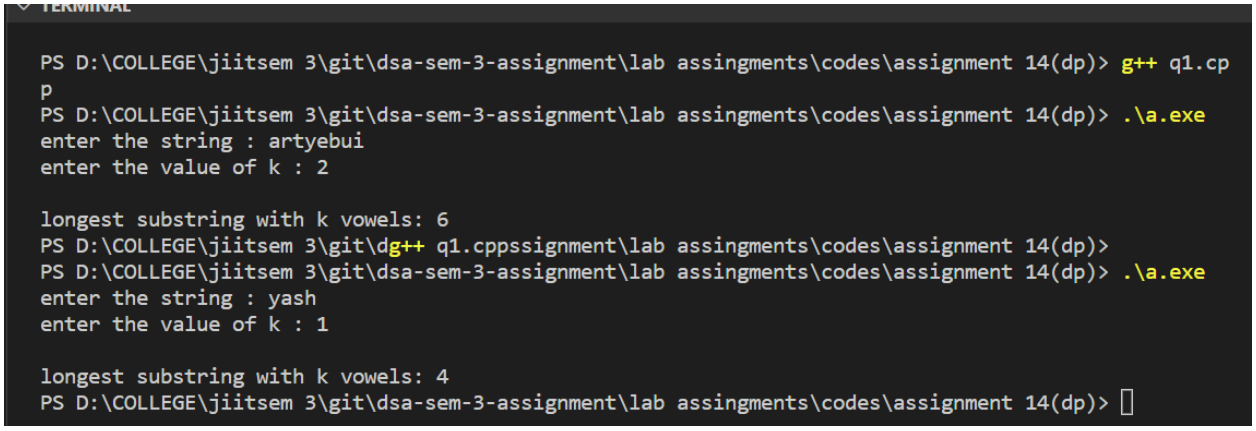
Q1

```
#include<iostream>
using namespace std;


// int longest_substring(string s,int ct,int &k,int i,int n,int l)
// {
//     cout<<s<<endl;
//     if(s.length()==0)
//     {
//         return 0;
//     }
//     if(s[i]=='a' || s[i]=='e' || s[i]=='i' || s[i]=='o' || s[i]=='u' )
//     {
//         if(ct<k)
//         {
//             return
max(1+longest_substring(s.substr(0,n-l),ct+1,k,i-1,n,l+1),longest_substring(s.substr(0,n-l),0,k,i-1
,n,l+1));
//         }
//         else
//         {
//             int a =n-s.length();
//             return max(1,longest_substring(s.substr(0,n-l),0,k,i-1,n,l+1));
//         }

//     }
//     else
//     {
//         return 1+longest_substring(s.substr(0,n-l),ct,k,i-1,n,l+1);
//     }
// }

// int main()
// {
//     string s;
//     getline(cin,s);
//     int n=s.length();
//     // s="artyebui";
//     int l=1;
//     int k=2;
//     cout<<longest_substring(s,0,k,n-1,n,l);
// }
```

```
int main()
{
    string s;
    cout<<"enter the string : ";
    getline(cin,s);
    int n=s.length();
    cout<<"enter the value of k : ";
    int k;
    cin>>k;
    int ans=0;
    for(int i=0;i<n;i++)
    {
        int ct=0;
        for(int j=i;j<n;j++)
        {
            if(s[j]=='a' || s[j]=='e' || s[j]=='o' ||  s[j]=='u' ||  s[j]=='i')
            {
                ct++;
                if(ct<=k)
                {
                    ans=max(ans,j-i+1);
                }
                else if(ct>k)break;
            }
            else
            {
                ans = max(ans,j-i+1);
            }
        }
    }

    cout<<"\nlongest substring with k vowels: "<<ans;

}
```



Q2

```
#include<iostream>
using namespace std;

int main()
{
    int n;
    cout<<"enter the length of ";
    cin>>n;
    int wt[n],val[n];
    for(int i=0;i<n;i++)
    {
        cout<<"enter the weight and val associated with it : ";
        cin>>wt[i]>>val[i];
    }
    int k;
    cout<<"enter the capacity of bag : ";
    cin>>k;
    int t[n+1][k+1];
    for(int i=0;i<n+1;i++)
    {
        for(int j=0;j<k+1;j++)
        {
            if(i==0 || j==0)
            {
                t[i][j]=0;
            }
        }
    }
    for(int i=1;i<n+1;i++)
    {
        for(int j=1;j<k+1;j++)
```

```
        {
            if(wt[i-1]<=j)
            {
                t[i][j]=max(val[i-1]+t[i-1][j-wt[i-1]],t[i-1][j]);
            }
            else t[i][j]=t[i-1][j];
        }
    }
    cout<<"\n max profit :  "<<t[n][k];
}
```

```
assignment 14(dp)> .\a.exe
enter the length of 4
enter the weight and val associated with it : 1 1
enter the weight and val associated with it : 3 4
enter the weight and val associated with it : 4 5
enter the weight and val associated with it : 5 7
enter the capacity of bag : 7

 max profit :  9
```

Q3

```
#include<iostream>
using namespace std;


//kadane algorithm
// T(n) = 0(n)
// s(n) = 0(1)
void solve(int arr[],int n)
{
    int sum=INT_MIN ,curr=0;
    int i=0;
    while(i<n)
    {
        curr=curr+arr[i];
        if(curr>sum)
        {
            sum=max(curr,sum);
        }
        if(curr<0)
        {
            curr=0;
        }
```

```
        i++;
    }
    cout<<"the largest sum of subbarray : "<<sum<<"\n";

}

int main()
{

    int t;
    cout<<"enter number of test case : ";
    cin>>t;
    while(t--)
    {
        int n;
        cout<<"enter the number of element in an array : ";
        cin>>n;
        int arr[n];
        cout<<"enter the elements in the array : ";
        for(int i=0;i<n;i++)
        {
            cin>>arr[i];
        }
        solve(arr,n);
    }
}
```

```
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\a
ssignment 14(dp)> g++ q3.cpp
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\a
ssignment 14(dp)> .\a.exe
enter number of test case : 1
enter the number of element in an array : 5
enter the elements in the array : 1 -2 3 4 -6
the largest sum of subbarray : 7
```

Q4

```
#include<iostream>
using namespace std;


bool fp(int arr[],int n)
{
    int sum=0;
    int i,j;
```

```
    for(int i=0;i<n;i++)
    {
        sum+=arr[i];
    }
    if(sum%2!=0) return false;
    bool dp[sum/2 +1][n+1];
    for( i=0;i<=n;i++)
    {
        dp[0][i]=true;
    }
    for(i=1;i<=sum/2;i++)
    {
        dp[i][0]=false;
    }
    for(i=1;i<=sum/2;i++)
    {
        for(j=1;j<=n;j++)
        {
            if(i>=arr[j-1])
            {
                dp[i][j]=dp[i][j] || dp[i-arr[j-1]][j-1];
            }
        }
    }
    return dp[sum/2][n];
}
int main()
{
    int n;
    cout<<"enter the value of n ";
    cin>>n;
    int arr[n];
    cout<<"enter the elemnts of array : ";
    for(int i=0;i<n;i++)
    {
        cin>>arr[i];
    }
    if(fp(arr,n)==true)
    {
        cout<<"\npartition possible .";

    }
    else
    {
```

```
        cout<<"\npartition is not possible . ";

    }
}
```

```
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
enter the elemnts of array : 3 1 1 2 2 1

partition possible .
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
assignment 14(dp)>.\a.exe
enter the value of n 3
enter the elemnts of array : 1 5 3

partition is not possible .
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
assignment 14(dp)>
```

Q5

```
#include<iostream>
using namespace std;

int ed(string s1,string s2,int m,int n)
{
    int dp[m+1][n+1];
    for(int i=0;i<=m;i++)
    {
        for(int j=0;j<=n;j++)
        {
            if(i==0)dp[i][j]=j;
            else if(j==0) dp[i][j]=i;
            else if(s1[i-1]==s2[j-1]) dp[i][j]=dp[i-1][j-1];
            else
            {
                dp[i][j]=1+min(dp[i][j-1],min(dp[i-1][j],dp[i-1][j-1]));
            }
        }
    }
    return dp[m][n];
}
int main()
{
    string s1,s2;
```

```
    cout<<"enter the source string : ";
    cin>>s1;
    cout<<"enter the destination string : ";
    cin>>s2;
    cout<<"\nmin steps : "<<ed(s1,s2,s1.length(),s2.length());
}
```

```
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
assignment 14(dp)> g++ q5.cpp
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
assignment 14(dp)> .\a.exe
enter the source string : vish
enter the destination string : vishal

min steps : 2
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
assignment 14(dp)> .\a.exe
enter the source string : yash
enter the destination string : agarwal

min steps : 6
PS D:\COLLEGE\jiitsem 3\git\dsa-sem-3-assignment\lab assingments\codes\
assignment 14(dp)>
```