2. Find the sum of digits of a number using recursion.

```
#include <iostream>
using namespace std;
int sumOfDigits(int n)
{
        if(n==0)
        {
              return 0;
        }
        else
        {
              return (n%10) + sumOfDigits(n/10);
        }
}
int main()
{
        int num;
        cout<<"\nENTER NUMBER: ";
        cin>>num;
        cout<<"\nSUM OF DIGITS: "<<sumOfDigits(num);
        return 0;
}
```

3. Find the sum of squares of first N odd natural numbers.

```
#include <iostream>
using namespace std;
int squareSum(int n)
{
    int sum = 0;
    for (int i = 1; i <=  n; i++)
        sum =sum+ (2*i - 1) * (2*i - 1);
    return sum;
}
int main()
{
```

```
    int n;
    cout<<"enter the number";
    cin>>n;
    cout << "the sum of square of odd numbers is "<<squareSum(n);
    return 0;
}

4. Write a program to display a solid and hollow rectangle.
       ***** *****
       ***** *   *
       ***** *****
  /*
 * prog4.cpp
 *
 *  Created on: 06-Dec-2021
 *      Author: Namratha
 */


#include <bits/stdc++.h>
using namespace std;
void print_hollow_rectangle(int n, int m)
{
    int i, j;

    for (i = 1; i <= n; i++)
    {
        for (j = 1; j <= m; j++)
        {
            if (i == 1 || i == n ||
                j == 1 || j == m)
                cout << "*";
            else
                cout << " ";
        }
        cout<<endl;
    }
}
void print_solid_rectangle(int n, int m)
{
    int i, j;
    for (i=1; i<=n; i++)
```

```
    {
        for (j=1; j<=m; j++)
            cout << "*";
        cout << "\n";
    }
}
int main()
{
    int rows = 3, columns = 5;
    print_solid_rectangle(rows,columns);
    cout<<"\n\n";
    print_hollow_rectangle(rows, columns);
    return 0;
}
```

5. Write a program to REVERSE the number?

```
/*
 * prog5.cpp
 *
 *  Created on: 06-Dec-2021
 *      Author: Namratha
 */

#include <iostream>
using namespace std;
int main()
{
    int n,rev = 0, rem;
    cout << "Enter an integer=";
    cin >> n;
    while(n!= 0)
    {
        rem = n%10;
        rev = rev*10 + rem;
        n /= 10;
    }
    cout << "Reversed Number=" << rev;
    return 0;
}
```

6. Write a program to convert BINARY to DECIMAL?

```
/*
 * prog6.cpp
 *
 *  Created on: 06-Dec-2021
 *      Author: Namratha
 */

#include <iostream>
#include <cmath>
using namespace std;
int convert(int,int);
int main()
{
 int n,a;
  cout << "Enter the number of digit in binary number: ";
  cin >> a;
  cout << "Enter a binary number: ";
  cin >> n;
  cout << n << " in binary = " << convert(n,a) << " in decimal";
  return 0;
}
int convert(int n,int a)
{
  int dec = 0, rem,i;
for(i=0;i<=a;++i)
{
    rem = n % 10;
    n=n/10;
    dec=dec+rem * pow(2, i);
  }
  return dec;
}
```

8. Write a program to display number of LOWERCASE, UPPERCASE, SPECIAL SYMBOLS,

```
/*
 * prog8.cpp
 *
 *  Created on: 06-Dec-2021
 *      Author: Namratha
```

```
 */

#include<iostream>
using namespace std;
void count(string str)
{
    int upper = 0, lower = 0, digit = 0, special = 0,space = 0,m ;
    m= str.length();
    for (int i=0; i<m;i++)
    {
        if (str[i] >= 'A' && str[i] <= 'Z')
            upper++;
        else if (str[i] >= 'a' && str[i] <= 'z')
            lower++;
        else if (str[i]>= '0' && str[i]<= '9')
            digit++;
        else if (str[i]== '\t' || str[i]== ' ' )
            space++;
        else
            special++;
    }
    cout << "Upper case letters: " << upper << endl;
    cout << "Lower case letters : " << lower << endl;
    cout << "Number : " << digit << endl;
    cout << "space : " << space << endl;
    cout << "Special characters : " << special << endl;
}
int main()
{
    string str;
    cout<<"enter the string= ";
    cin>>str;
    count(str);
    return 0;
}

10. Write a program to insert an element into existing array in a specified po
/*
 * prog10.cpp
 *
 *  Created on: 08-Dec-2021
 *      Author: Namratha
```

```
 */


#include <iostream>
using namespace std;
int main()
{
   int a[100], pos, i, n, value;
   cout<<"Enter number of elements in array\n"<<endl;
   cin>>n;
   cout<<"Enter elements\n"<<endl;
   for (i = 0; i < n; i++)
   {
   cin>>a[i];
    }
   cout<<"Enter the location where you wish to insert an element\n"<<endl;
   cin>>pos;
   cout<<"Enter the value to insert\n"<<endl;
   cin>>value;
   for (i = n - 1; i >= pos - 1; i--)
   {
  a[i+1] = a[i];
    }
       a[pos-1] = value;
    cout<<"Resultant array is\n"<<endl;
   for (i = 0; i <= n; i++)
   {
      cout<<a[i];
      cout<<"\n";
         }
   return 0;
}
```

11. Write a program to search an element in the existing array?

```
/*
 * prog11.cpp
 *
 *  Created on: 08-Dec-2021
 *      Author: Namratha
 */
```

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

int main(){
    int a[100], n, i, num;
    cout << "Enter Number of Elements in Array\n";
    cin >> n;
    cout << "Enter elements of the array  \n";
    for(i = 0; i < n; i++){
        cin >> a[i];
    }
    cout<< "Enter a number to search in Array\n";
    cin >> num;
    for(i = 0; i < n; i++){
        if(a[i] == num){
            cout << "Element found at position " << i;
            break;
        }
    }
    if(i == n){
        cout  << "Element Not Present in Array\n";
    }
    return 0;
}
```

13. Write a program to remove vowels from string.

```
/*
 * prog13.cpp
 *
 *  Created on: 08-Dec-2021
 *      Author: Namratha
 */

#include<iostream>
#include<string.h>
using namespace std;
int main()
{
       char str[100];
       int i,j,len=0;
       cout<<"Enter a string : ";
```

```
        cin>>str;
        len=strlen(str);
        for(i=0; i<len; i++)
        {
                if(str[i]=='a'||str[i]=='e'||str[i]=='i'||str[i]=='o'||str[i]==
                {
                        for(j=i; j<len; j++)
                        {
                                str[j]=str[j+1];
                        }
                i--;
                len--;
                }
        }
        cout<<"After deleting the vowels, the string will be : "<<str;
    return 0;
}
```

15. Write a program for ZIP, ZAP and ZOOM game:
    1. If the number is multiple of 3 to display “ZIP”
    2. If the number is multiple of 5 to display “ZAP”
    3. If the number is multiple of 3 and 5 to display “ZOOM”
    4. If it does not satisfy any of the above conditions, display “INVALID

```
  /*
 * prog15.cpp
 *
 *  Created on: 08-Dec-2021
 *      Author: Namratha
 */


#include <iostream>
using namespace std;
int main() {
    int n;
    cout << "Enter the number ";
    cin >> n;
    if(n%3==0 && n%5==0)
        cout<<"ZOOM";
    else if(n%5==0)
        cout<<"ZAP";
```

```
        else if(n%3==0)
            cout<<"ZIP";
        else
            cout<<"INVALID";
    }
```