Assignment 1

1. Number Manipulation and Prime Numbers

Write a C++ program to take a positive integer.n as input and:

1. Check whether n is a prime number.

2. If it is not prime, find all its factors.

3. If it is prime, find the next prime number greater than n.
```cpp
*/
#include<iostream>
using namespace std;
int main(){
  int n ,i=2;
  cout<<"enter number:";
  cin>>n;
  for(i=2;i<=n;i++){
    if(n % i==0){
      break;
    }
  }
  if(n==i){
    cout<<n<<" is prime number\n.";
    int secondPrime=n+1;
    while(true){
    for( i=2;i<secondPrime;i++){
      if(secondPrime % i==0){
        break;
      }
    }
    if(i==secondPrime){
      cout<<"second prime number is"<<secondPrime<<endl;
      break;
    }
    secondPrime++;
  }
  }
  else{
   cout<<n<<" is not prime number\n";
```

```
    for(int i=1;i<=n;i++){
      if(n % i==0){
         cout<<i<<" ";
      }
    }
     cout<<endl;
    }
    return 0;
    }
```
[31/05/25, 8:58:36 PM] Heer Ka: /*2. Array Operations

Write a program that performs the following operations on an array:

a. Accept an integer array from the user (size determined at runtime).

b. Reverse the array and display it

c. Find and display the second largest and second smallest elements in the array.
*/
```cpp
#include<iostream>
#include<algorithm>
using namespace std;
int main(){
int n,i;//n is size of an array
//Accept an integer array from the user (size determined at runtime)
cout<<"Enter number of elements you want to input:"<<endl;
cin>>n;
int arr[n];
for( i=0;i<n;i++){
   cout<<"enter elements:"<<i+1<<"="<<" ";
   cin>>arr[i];
}
cout<<"elements are:"<<endl;
for(i=0;i<n;i++){
   cout<<arr[i]<<endl;
}
//Reverse the array and display it
   cout<<"reverse elements are:"<<endl;
for(i=n-1;i>=0;i--){
   cout<<arr[i]<<endl;
}
//Find and display the second largest and second smallest elements in the array.
sort(arr,arr+n);
cout<<"sorted array:"<<endl;
for(i=0;i<n;i++){
cout<<arr[i]<<endl;
}
```

```
int arr_noduplicate[n],size=0;
for(i=0;i<n;i++){
    if(arr[0]||arr[i]!=arr[i-1]){
        arr_noduplicate[size]=arr[i];
        size++;
    }
}
if(size<2){
    cout<<"there is no enough number to find second smallest and largest
number"<<endl;
}else{
    cout<<"second smallest number is:"<<arr_noduplicate[1]<<endl;
    cout<<"second largest number is:"<<arr_noduplicate[size-2]<<endl;
}
return 0;
```

[31/05/25, 8:58:37 PM] Heer Ka: /*String Manipulation

Write a program that:

a. Accepts a string from the user.

b. Checks whether the string is a palindrome (ignoring spaces and case sensitivity).

c. Counts and displays the frequency of each character in the string (case insensitive).

d. Replace all vowels in the string with a specific character (e.g. ").*/

```
#include<iostream>
#include<string>
using namespace std;
int main(){
//Accepts a string from the user.
string str,newStr="",reverseStr="";
char replaceChar='*';
cout<<"Please enter string:";
getline(cin,str);
for(int i=0;i<str.length();i++){
    char ch=str[i];
    if(ch>='A'&&ch<='Z'){
        ch+=32;
    }
    if(ch!=' '){
        newStr=newStr+ch;
    }
}
    for(int i=newStr.length()-1;i>=0;i--){
reverseStr+=newStr[i];
```

```cpp
    }
    // Checks whether the string is a palindrome (ignoring spaces and case sensitivity).
    if(newStr==reverseStr){
        cout<<str<<" String is palindrome"<<endl;
    }else{
        cout<<str<<" String is not palindrome"<<endl;
    }
//Replace all vowels in the string with a specific character (e.g. ").
for(int i=0;i<newStr.length();i++){
    char ch=newStr[i];
    if(ch=='a'||ch=='e'||ch=='i'||ch=='o'||ch=='u'){
        cout<<replaceChar;
    }else{
        cout<<ch;
    }
}
//Counts and displays the frequency of each character in the string (case insensitive).
    cout<<"\n number of times character"<<endl;
for(char ch='a';ch<='z';ch++){
    int count=0;
    for(int i=0;i<newStr.length();i++){
        if(newStr[i]==ch){
            count++;
        }
    }
    if(count>0){
        cout<<ch<<"="<<count<<endl;
    }
}
return 0;
```

[31/05/25, 8:58:37 PM] Heer Ka: /*print a spiral pattern for matrix=4*4
Spiral Number Pattern

Print a spiral pattern of numbers for a given size n.

Example for 4 (4x4 matrix)

1 2 3 4
12 13 14 5
11 16 15 6
10 9 8 7
*/

```cpp
#include<iostream>
using namespace std;
int main(){
```

```cpp
int n=4;
int spiral[4][4]={0};
int x=0,x2=n-1,y=0,y2=n-1;//x=top,x2=bottom,y=left y2=right
int num=1;
while(num<=n*n){
    for(int i=y;i<=y2;i++){
        spiral[x][i]=num;
        num++;
    }
    x++;
    for(int i=x;i<=x2;i++){
        spiral[i][y2]=num;
        num++;
    }
    y2--;
    for(int i=y2;i>=y;i--){
        spiral[x2][i]=num;
        num++;
    }
    x2--;
    for(int i=x2;i>=x;i--){
        spiral[i][y]=num;
        num++;
    }
    y--;
}
for(int i=0;i<n;i++){
    for(int j=0;j<n;j++){
        cout<<spiral[i][j]<<" \t";
    }
    cout<<endl;
}
return 0;
}
```