1. Write a program that takes the size of an array from the user, reads its elements, then asks the user to enter two numbers (supposed to be found in the array) and finally calculates and displays the sum of the numbers between the two numbers – excluding the two numbers themselves-

Sample execution:

Enter the size of the array: 8

Enter the numbers: 4,7,-3,7,1,-6,3,8

Enter two numbers from the array: 7, 3

Sum of the numbers between 7,3 is: -1

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

void main ()
{
	int arrSize;
	int arr[20];
	int num1,num2;

	cout<< "Please Enter Arr. Size";
	cin>>arrSize;
	cout<< "Enter the numbers ";
	for (int i =0; i<arrSize;i++)
		cin>>arr[i];
	cout<<"Enter two numbers from the array ";
	cin>>num1>>num2;

	//search for the index of the first num
	int index1;
	for(int i =0;i<arrSize;i++)
	{
		if(arr[i]==num1)
		{
			index1= i;
			break;
		}
	}

	//search for the index of the second num
	int index2;
	for(int i =0;i<arrSize;i++)
	{
		if(arr[i]==num2)
		{
			index2= i;
			break;
		}
	}

	//sum the numbers between them;
```

```
	int sum=0;
	for(int i = index1+1 ; i<index2;i++)
		sum+=arr[i];

	cout<<"sum of the numbers between "<<num1<<" , "<<num2<<" is
"<<sum<<endl;



}
```

2.There are **set of employees**, each having ***id, name, hours worked, and overtime hours*.**

The **origin payment** for each employee is the hourly rate times the hours worked.

The **overtime payment** for each employee is one and half of the hourly rate times the overtime hours.

If the **hourly rate** for all employees is **25.5**,

write a program that asks **the user to enter the number of the employees** and **then enter the data of those employees** in the **main() storing them in array.**

Then **calculates for each employee his overall payment and store it in the same array,** which is the summation of his origin payment and his overtime payment.

Sample Input:

The number of employees : 4

Enter the 4 employee' data :

ID	Name	hrs Worked	Overtime hrs
1	Ahmed	30	5
2	Aly	35	2
3	Mona	25	1.5
4	Layla	27.5	0

Sample Output:

ID	Name	Total Payment
1	Ahmed	956.25
2	Aly	969
3	Mona	694.875
4	Layla	701.25

Note that this solution uses 2 Dim array , you can use array of structs to avoid the conversion process , Example : Q6.

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

void main ()
{
	int numOfEmp;

	string arr[10][5];
	cout<<"The Number of Employees : ";
	cin>>numOfEmp;
	cout<<"Enter The Employee's data : \n ID  Name hrs Worked  Overtime hrs
"<<endl;
	double hrsWorkedInteger , OverallPayment;
	double OverhrsInteger;
	for(int i=0;i<numOfEmp;i++)
	{
		cin>>arr[i][0] >> arr[i][1] >>arr[i][2] >>arr[i][3] ;//enter the
ID , name , hrsWorked , Overtime hrz
		hrsWorkedInteger= stod(arr[i][2]); // convert from string to
double to do calculations
		OverhrsInteger = stod (arr[i][3]);
		OverallPayment = hrsWorkedInteger*25.5 + 25.5*1.5*OverhrsInteger;
		arr[i][4] = to_string((long double)OverallPayment); // convert to
string again to store it in array

	}
	cout<< " ID\tName\tOverall Payment"<<endl;
	for(int i=0;i<numOfEmp;i++)
	{
		cout<<arr[i][0]<<"\t"<<arr[i][1]<<"\t"<<arr[i][4]<<endl;
	}
}
```

3 - Write a program that ***gets the occurence of specific number*** by **asking the user to type 10 integers** and **save them in array**, **then ask him to input a specific number** to find how many this number is repeated by creating **"GetOccurence"** function.
"GetOccurance" function **takes the input number and return its occurence in the array by searching for this number in the given array.**
Note : This should be repeated till the use says no .

Sample Run :

Enter the 10 numbers :

5 7 2 3 7 5 2 0 0 0

Enter the number : 5

The number 5 is repeated 2 times.

Do you want to continue (y/n)?? y

Enter the number :8

The number 8 is repeated no times.

Do you want to continue (y/n)?? y

Enter the number :0

The number 0 is repeated 3 times.

Do you want to continue (y/n)?? n

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

int getOccurence (int n , int arr[])
{
	int counter =0;
	for(int i=0;i<10;i++)
	{
		if(arr[i]==n)
			counter++;
	}

return counter;
}
```

```
void main ()
{
       int num;
    int arr[10];
       char choice;

       cout<<"Enter the 10 numbers  : ";

       for(int i=0;i<10;i++)
       {
              cin>>arr[i];

       }
       do{
       cout<<"Enter the number ";
       cin>>num;

       cout << "The Number "<< num<<" repeated " <<getOccurence(num,arr)<<"
times"<<endl;
       cout<<"Do you want to continue (Y/N)? ";
       cin>>choice;
       }while(choice =='y');

}
```

4- Write a program **that asks the user to enter n numbers in an array**. Create **"GetPrime"** function **that take element by element in the array as input** and **check if its prime or not by return bool (true if prime false otherwise).**
The prime numbers should be stored in another array and displayed at the end of the program.

Sample Run:
Enter the number of elements : 10
Enter the elements :
1 2 3 4 5 7 8 9 10

Prime Numbers are :
1 3 5 7

Sample Run:
Enter the number of elements : 5
Enter the elements :
2 4 6 8 10

Prime Numbers are : No prime numbers.

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

bool isPrime (int num)
{
	if(num == 2)
		return false;
	for(int i = 2 ; i<num;i++)
	{
		if(num%i==0)
			return false;
	}
	return true;
}

void main ()
{
	int num;
	int arr[20];
	int primearr[20];


	cout<<"Enter the  number of elements :";
	cin>>num;
	int j=0; // counter for the prime array
	cout<<"Enter the numbers:";
	for(int i=0;i<num;i++)
	{
		cin>>arr[i];
		if(isPrime(arr[i])==true)
		{
			primearr[j]=arr[i];
			j++;
		}
	}
	cout<<" Prime Numbers are : ";
	if(j ==0 )//there are no prime numbers
		cout<<" No Prime Numbers "<<endl;
	else
	{
	for(int i =0 ; i<j ; i++)
		cout<<primearr[i]<<"  ";
	cout<<endl;
	}

}
```

5-Write a program **that asks the user to enter value N** (if N has negative value stop asking the user) and **display** an output like the following:

Sample Execution :

Enter N : 1

*

Enter N : 2

**

*

Enter N : 3

***

**

*

Enter N : -1

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


	cout<<"Enter N :";
	cin>> N;
	while(N>0)
	{
		for(int i=0;i<N;i++)
		{
			for(int j=N;j>i;j--)
				cout<<"*";
			cout<<endl;
		}
		cout<<"Enter N:";
		cin>>N;
	}

}
```

6. Write a program that takes the details of 10 candies (name , price , calories) **in an array of structs**. Then asks the user how much calories he want to consume. Depending on the user's answer, the program should print a list of all candies (name, price) that has calories equal to the user's answer. Then it should print the candy with best price in this list.

   Sample execution:

   Enter the candies details:

   Jellycola 15 200
   M. chocolate 30 500
   X.candy 10 200
   Bondy 20 450
   jersy 5 150
   till all 10 candies are filled

   Enter how many calories you want to consume: 200

   The list of candies:

   Jelly cola 15
   X.candy 10

   Best price is: X.candy of price 10

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

struct Candy
{
	string name;
	float price;
	int calories;
};
void main ()
{
	Candy candyArray [ 10];
	int numOfCalories , indexOfbestPrice ;
	float bestprice=1000 ;

	cout<<"Enter The Candy details :"<<endl;
	for(int i =0;i<10;i++)
	{
		cin>>candyArray[i].name >> candyArray[i].price >>
candyArray[i].calories ;
	}
```

```
        cout<<" Enter how many calories you want to consume ";
        cin>>numOfCalories;
        for (int i=0; i<10;i++)
        {
                if(candyArray[i].calories==numOfCalories)
                {
                        cout<<candyArray[i].name<<"
"<<candyArray[i].price<<endl;
                        if(candyArray[i].price<bestprice)
                        {
                                bestprice=candyArray[i].price;
                                indexOfbestPrice=i;
                        }
                }
        }

        cout<< "Best price is : " <<candyArray[indexOfbestPrice].name<<" of
price "<<candyArray[indexOfbestPrice].price<<endl;
}
```

7.Write a program that will take from user 10 positive numbers in array then display number & its binary representation. This program should consist of a **main()** function, which takes the input from the user, and a second function called **convertToBinary(int),** which converts the integer argument passed to its binary form then display the number and its result.

Hint: to convert to binary get the number keep dividing by 2 till it is 1 the reminder of the division is the binary representation

Ex:

46	0
23	1
11	1
5	1
2	0
1	1

its binary is: 101110

Sample execution:

Enter and array: 2, 6, 5, 8, 12, 4, 7, 3,10,0

The binary of each number is:

2	10
6	110
5	101
8	1000
12	1100
4	100
7	111
3	11
10	1010
0	0

```
#include <iostream>

using namespace std;

void convertToBinary(int num )
{
	if(num==0)
	{
		cout<<0;
		return;
	}
	int output[10];
	int i=0;
	while(num!=0)
	{
	    output[i] =num%2;
	    num=num/2;
		i++;
	}
	for(int j=i-1 ; j>=0;j--) //print the array in reverse
		cout<<output[j];
}
void main ()
{
	int Array [ 10];

	cout<<"Enter an Array :"<<endl;
	for(int i =0;i<10;i++)
	{
		cin>>Array[i] ;
	}
	cout<<"The binary of each number is :"<<endl;

	for(int i =0;i<10;i++)
	{
		cout<<Array[i]<<"\t";
		convertToBinary(Array[i]);
	 cout<<endl;
	}


}
```

8.Write a program that asks the user to enter **n**x**m** matrix, put its transpose in anther 2d array. The program should display the transpose then multiply it by a scalar number the user will give and show the result.

Note: max **n**x**m** is 5X5

Sample execution:

Enter number of rows and then columns: 2 3

Enter Matrix elements:

1 2 3

4 5 6

Its Transpose is:

1 4

2 5

3 6

Give the scalar number: 5

The result is:

5 20

10 25

15 30

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


void main ()
{
	int Array [5][5] , row, column , scalar;
	cout<<"Enter number of rows and then columns :";
	cin>>row>>column;
	cout<<"Enter Matrix elements:"<<endl;

	for(int i =0;i<row;i++)
	{
		for(int j=0;j<column;j++)
			cin>>Array[i][j];
	}
		cout<<"The Transpose is "<<endl;

	for(int i =0;i<column;i++) // reverse the row and columns
	{
		for(int j=0;j<row;j++)
			cout<<Array[j][i]<<"\t";    // j corresponds to the row and
i corresponds to the column
		cout<<endl;
```

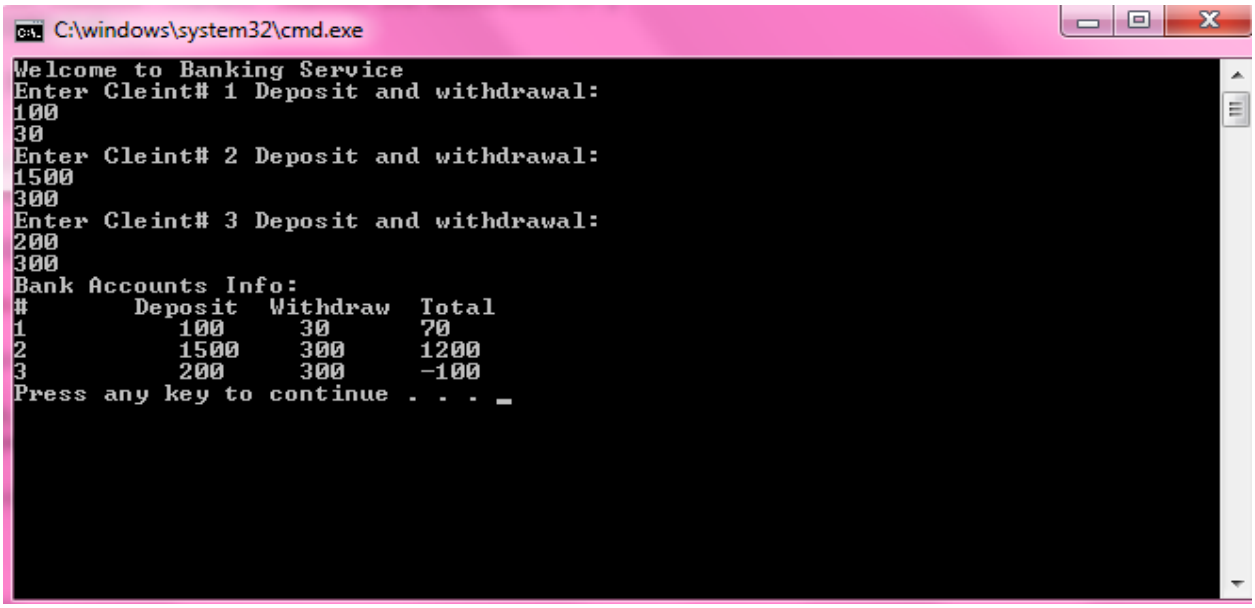
```
        }

        cout<<"Give the scalar number: ";
        cin>>scalar;
        cout<<"The result is : "<<endl;
        for(int i =0;i<column;i++) // multiply the transpose by a scalar
        {
                for(int j=0;j<row;j++)
                {
                        Array[j][i]*=scalar;
                        cout<<Array[j][i]<<"\t";
                }
                cout<<endl;
        }
}
```

9. Develop a "Banking Service" program that **reads** from the user 3 bank accounts transactions (deposit and withdrawal) for 3 clients and ***calculates the total***(deposit-withdrawal) for each client then ***displays*** them in a *tabular* form.

Your Program will read the required information in the **main** function and send them to a function called ***Transaction()*** *to calculate and display the results.*

(***Hint****: use 2d Array to store the given and the calculated information, given that the first column would be set to the Client serial number (****DO NOT*** *read it from the user))*

Sample Run



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

void Transaction (int arr[][4])//function to calculate and display the results
{
	cout<<"Bank Account Info "<<endl;
	cout<<"#\tDeposit\t\tWithdraw\tTotal"<<endl;
	for(int i=0;i<3;i++)
	{
		arr[i][3]=arr[i][1]-arr[i][2];//calculate the total

	cout<<arr[i][0]<<"\t"<<arr[i][1]<<"\t\t"<<arr[i][2]<<"\t\t"<<arr[i][3]<<
endl;

	}

}
void main ()
{

	int arr[3][4];
	cout<<"Welcome To Banking Service"<<endl;
	for(int i=0;i<3;i++)
	{
		arr[i][0]=i+1;//the ID;
		cout<<"Enter Client #"<<i+1<<" Deposit and Withdrawal : "<<endl;
		cin>>arr[i][1]>>arr[i][2];

	}
	Transaction(arr);
}
```

10. Develop an "Automatic Teller Machine(ATM) Service" program that **reads** from the user bank account information (initial amount, deposit and withdrawal) and sends them to a function called **transaction()** that takes in 3 arguments and returns the total *balance (initial amount+ deposit-withdrawal).* Your Program should repeat the process for many clients until the user asks it to quit.

Sample Run:

Welcome to ATM Banking Service
Please enter your account initial amount, deposited amount and the withdrawal amount:
1000
500
700
your balance now is : **800**
would you like to repeat (y/n) ? **n**
Thank you for your trusting us.
Press any key to continue...

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

double Transaction (double iAmount , double Dep , double With)
{
	double bal = iAmount+(Dep-With);
	return bal;
}
void main ()
{

	double initAmount , depos, withdrawal ;
	char choice;
	cout<<"Welcome To ATM Banking Service"<<endl;
	do
	{
	cout<<"Please enter your account initial amount, deposited amount and
the withdrawal amount:"<<endl;
	cin>>initAmount>>depos>>withdrawal;
    cout<<"your balance now is :
"<<Transaction(initAmount,depos,withdrawal)<<endl;
	cout<<"would you like to repeat (y/n) ? ";
	cin>>choice;
	}while(choice=='y');
	cout<<"Thank you for your trusting us."<<endl;

}
```