Question 1:

Write a program that circular shift dynamic array N-times to the left. The program should ask the user for array size and number of shifts.

Note :only **dynamic** Arrays are allowed, No Global variables allowed

```
void input(int* arr, int size);
void shift(int * arr, int size, int numOfShifts);
void output(int* arr, int size);
```

```
Enter array size: 5
Enter number of shifts: 3
Enter array
1
2
3
4
5
The Output Array
4 5 1 2 3
```

Question 2:

Write a program that asks the user to type n integers and save them in dynamic array, and then ask him to input a specific number and choose to either remove 1st Occurrence or All Occurrence of the number in the array.

By using the following functions

- Void Remove(int *arr, int &size , int num)
- Void RemoveAll(int *arr, int &size , int num)

The program should display the array after the remove.

Note : This should be repeated till the use doesn't enter "y" .

Note :only **dynamic** Arrays are allowed, No Global variables allowed

Sample Run :

Enter the size : 10
Enter the 10 numbers : 5 7 2 3 7 5 2 0 0 0
Enter the number : 5
Enter 1 to Remove once
2 to Remove all Occurrence: 2
The array of size 8:
7 2 3 7 2 0 0 0

Do you want to continue (y/n)?? y
Enter the number :8
Enter 1 to Remove once
2 to Remove all Occurrence: 1
The array of size 8:
7 2 3 7 2 0 0 0
Do you want to continue (y/n)?? n

Question 3:
Calculate trains remaining distance

The user will enter trains count then trains' data where each train's data contain train's number and velocity (km/h) , after that the user will be asked to enter total distance (km) that should be covered by all the trains and the time passed in hours.

The program should display each train's number and its remaining distance .

Note: (Velocity = distance / time)

Use function :

void CalcAndDisplayRemainingDistance(Train *trains, int trainsCount, float totalDistance, float hoursPassed);

Sample run:
Enter trains count : 2
Enter train 1 (number) : 960
Enter train 1 (velocity) : 150
Enter train 2 (number) : 550
Enter train 2 (velocity) : 100

Enter the total distance : 1500
Enter time passed : 7
The remaining distance (train 960) : 450 Km
The remaining distance (train 550) : 800 Km

Question 4:

Write a program that takes the details of hotels (name , rating , pricePerNight) **in a array of structs**. Then asks the user how much he is willing to pay for the hotel. Depending on the user's answer, the program should print a list of all hotels (name, price) equal to or less than the user's input .Then it should print the hotel with best rating in this list.
You should use the following functions :

- void input(hotel arr[] ,int size)
- int displayhotels(hotel arr [] , int size, int pay) // returns the index of the hotel with the best rating.

Sample run:
Enter the number of hotels : **5**
Enter the hotels details:
Fairmont 4.0 350
InterContinental 4.5 500
Marriott 4.7 300
Novotel 3.5 250
Hilton 4.8 450
Enter how much money you want to pay : **300**
The list of hotels:
Marriott 300
Novotel 250
Best hotel is: Marriott with rating 4.7

Question 5:

Write a program that asks the user to enter the size and data of dynamic array of actors. Where each actor(name, age and array of 3 movies he acted in). The program should ask the user to select actor then display the actors who acted with him in the movies (has common movie name) and the movies they acted together

use a structure for actor.
Use the functions:
Void DisplayCommon(actor * All,int Size, string actorName)

Sample Run:

Enter the number of actors: **3**
Enter the actors details:
Ali 30 **m1 m6 m5**
Mona 28 **m4 m7 m1**
Rony 32 **m6 m4 m5**
Enter the desired actor: Ali

Ali acted with Mona in movies **m1**
Ali acted with Rony in movies **m6 m5**

Question 6:

The history teacher at your school needs help in grading a True/False test for a group of students. The student ID and test answers are entered as follows:
Enter student ID :ABC54301 Enter student's answers :TFTFTFTT TFTFTFFTTFT
this indicates that the student ID is ABC54301 and the answer to question 1 is True, the answer to question 2 is False, and so on. This student did not answer question 9 as ther is a space. The exam has 20 questions their true answers are TFFTFFTTTTFFTFTFTFTT, Each correct answer is awarded two points, each wrong answer gets one point deducted, and no answer requires no deduction "no action". Write a program that processes the test data and implements **calculatescore() function** that takes the answers as an input and returns the score. The output should be the student's ID, followed by the answers, followed by the test score. only **dynamic** Arrays are allowed

Sample run: Enter Students Count : 3 Enter student ID :ABC54301 Enter student's answers :TFTFTFTT TFTFTFFTTFT Enter student ID :BOC54 Enter student's answers :TFTFTFTT TFTFTFFTTF "there are 2 spaces in the mid" Enter student ID :ZBO456 Enter student's answers : TFFTFFTTTTFFTFTFTFTT	Students Info: ABC54301 TFTFTFTT TFTFTFFTTFT 11 BOC54 TFTFTFTT TFTFTFFTTF 15 ZBO456 TFFTFFTTTTFFTFTFTFTT 40

Question 7: Calculate straight lines mid point

The user will enter a group of straight lines each line contains Start point , End point and mid point, each point contains X and Y . The user will specify the lines count at the start of the program and enter the start point and end point for each , and the program will calculate the mid point of each line and display them .
Use structure StraightLine and structure point.
Note : Mid=(Start+End)/2

Use function :
void CalcMidPoints (StraightLine lines[], int size);

Sample Run:
Enter straight lines count : 2

Enter line 1 (Start Point): 1 2
Enter line 1 (End Point): 4 5

Enter line 2 (Start Point): 3.5 9
Enter line 2 (End Point): 6.5 1

Line 1 mid point : 2.5 3.5
Line 2 mid point : 5 5

Question 8:

Write a program that takes from the user n product array, each product has an ID and price(price consists of (int pound , int piastre)) and then outputs the average of the prices and the IDs of the products that has a price larger than or equal to the average.

The program uses the following function to calculate the average:

float calculateAverage(product arr[],int n)

Use structure product and structure price.

Note: Pound = 100 piastres

Sample Run :

Enter the number of products:**3**
Enter the ID : **124**
Enter the price pounds : **20**
Enter the price piastres: **50**
Enter the ID : **111**
Enter the price pounds : **10**
Enter the price piastres: **40**
Enter the ID : **232**
Enter the price pounds : **11**
Enter the price piastres: **00**

The average is 13.96
The products with price higher than the average : 124

Question 9:

Write a C++ program that reads 2 arrays of numbers from a user (Arr1 and Arr2) and create third array (Arr3) that concatenate the values of the first 2 arrays alternatively.

Hint:

The size of both Arr1 and Arr2 is equal.

Use dynamic arrays and no global variables.

Use the following function:

```
void Concate_Alter(int *Arr1 , int *Arr2,int *Arr3, int Size)
void display(int *Arr ,int Size)
```

Sample of Execution:

```
Enter Size of 2 Arrays:  5

Enter Values of First Array: 1 2 3 4 5

Enter Values of Second Array: 6 7 8 9 10

The Third Array: 1 6 2 7 3 8 4 9 5 10
```

Question 10:

Write a program that takes the size of a 2-D arrays (size x size) , enter their elements, and sets the diagonal of the 2-D array to zero.

Use the following functions:

void input(int **arr,int size)

void setDiagonal (int **arr,int size)

void display(int **arr,int size)

Sample Run:

Enter the size of the 2D array : **3**

Enter the array:

1 2 4

3 4 5

2 3 4

Output:

0 2 4

3 0 5

2 3 0