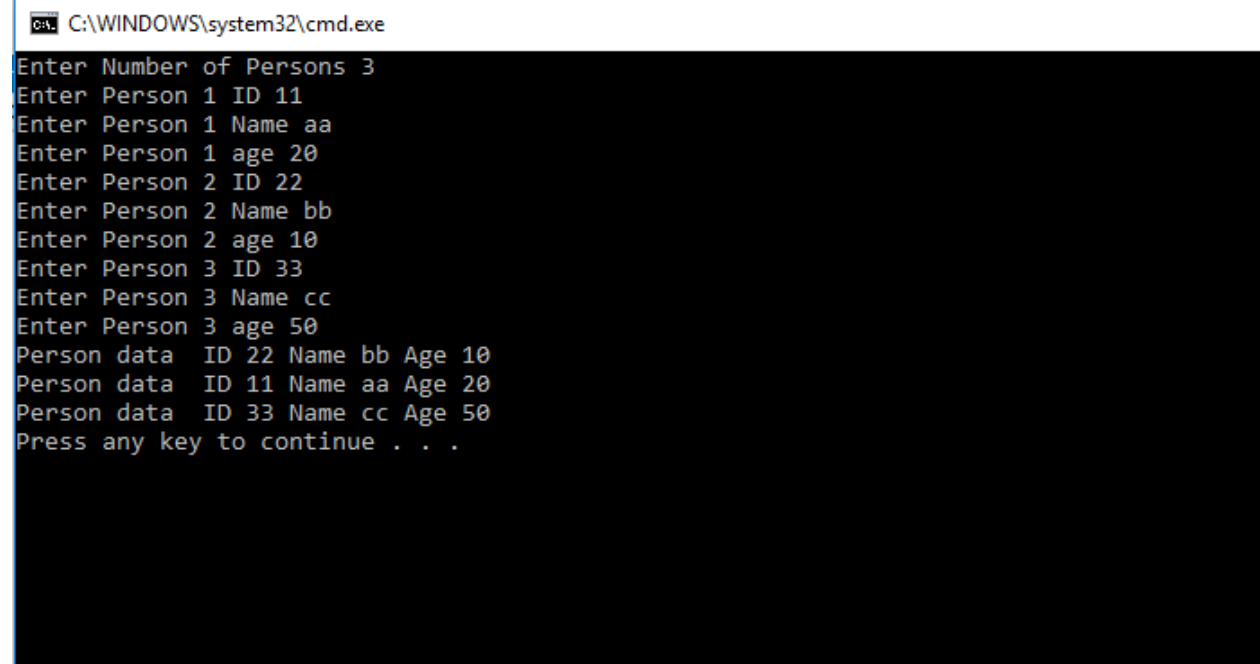**Question 1:**

Write a C++ program that represents Person as a structure each Person has ID, name and age Write a function should read from the user a list of Persons and a function to sort them in increasing order according to age

Use functions:

void Input(Person *Arr, int Size)
void Sort(Person *Arr, int Size)

Note: Use dynamic arrays and No global variables

```
C:\WINDOWS\system32\cmd.exe

Enter Number of Persons 3
Enter Person 1 ID 11
Enter Person 1 Name aa
Enter Person 1 age 20
Enter Person 2 ID 22
Enter Person 2 Name bb
Enter Person 2 age 10
Enter Person 3 ID 33
Enter Person 3 Name cc
Enter Person 3 age 50
Person data  ID 22 Name bb Age 10
Person data  ID 11 Name aa Age 20
Person data  ID 33 Name cc Age 50
Press any key to continue . . .
```

Question 2:

Write a C++ program that represents movies as a structure each movie has ID, title and release date (day, month, and year).

Program should read from the user a list of movies and a specific date then display all the movies whose release date before the specified date.
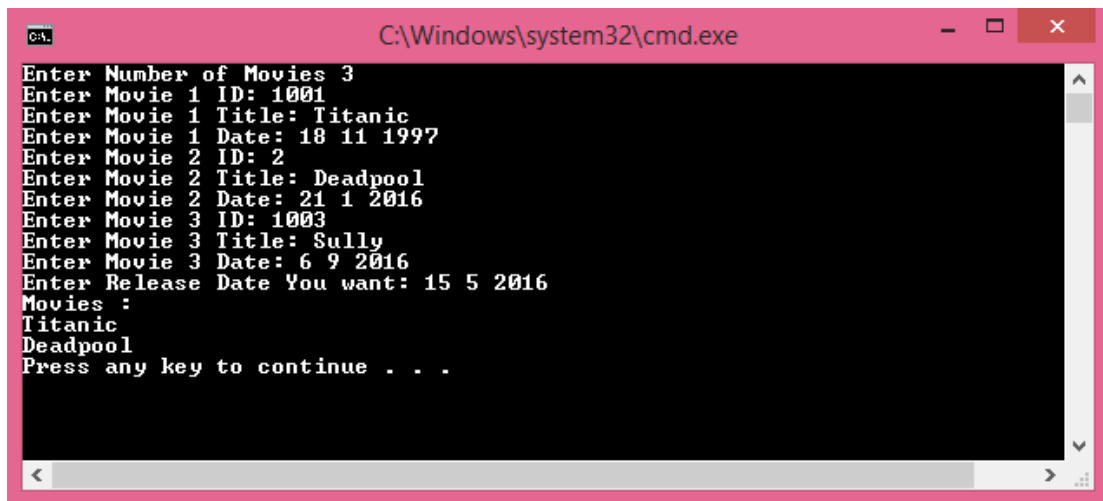
Hint:

Use structures and dynamic arrays.

Use the following function:

```cpp
void Search_Movies (Movie *AllMovies , int NumberOfMovies , Date SearchDate)
```

Sample of Execution:

Question 3: Calculate triangles types

The user will enter triangles count then enter each triangle's data where it contains three consecutive points , and each point contains X,Y.

The program should display each triangles type if it's isosceles or not.

Hint:

distance a = SQRT$((x2-x1)^2 + (y2 - y1)^2)$

Use functions :
bool IsIsosceles (**triangle** t);
float CalcLineLen (**Point** p1 , **Point** p2);
Use structures (Triangle, Point), dynamic arrays and No global variables

Isosceles :
Only two sides are equal

Sample Run:
Enter triangles count : 2
Enter point 1 : 1 2
Enter point 2 : 4 5
Enter point 3 : 7 8

Enter point 1 : 1 2
Enter point 2 : 4 7
Enter point 3 : 7 3
Triangle 1 type is isosceles
Triangle 2 type is not isosceles

Question 4:

The user will enter polygons count then enter each polygon's data where it contains four consecutive points , where each point contains X,Y. **(all angles of the polygons are 90 degree)**

The program should display each polygon's type whether it is square or rectangle .

Hint: **distance a = SQRT((x2-x1)² + (y2 - y1)²)**

$$distance\ a = SQRT((x2-x1)^2 + (y2 - y1)^2)$$

Use functions :

bool IsSquare (**polygon** p);

float CalcLineLen (**Point** p1 , **Point** p2);

Use structures (Polygon, Point), dynamic arrays and No global variables

Sample Run:

Enter polygons count : 2

Enter point 1 : 1 2

Enter point 2 : 1 5

Enter point 3 : 4 5

Enter point 4 : 4 2

Enter point 1 : 2 2

Enter point 2 : 2 7

Enter point 3 : 4 7

Enter point 4 : 4 2

Polygon 1 type is square

Polygon 2 type is Rectangle

Question 5:

Write a program that gets the occurence of specific number by asking the user to type n integers and save them in dynamic 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 the dynamic array and return its occurence in the array by searching for this number in the given array.

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

Use dynamic arrays and No global variables

<u>Sample Run :</u>

Enter the size : **10**

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 0 times.

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

Question 6:

Write a program that asks the user to type n integers and save them in dynamic array, then ask him to input a specific number to find the last index this number is repeated by creating a function called "GetLastOccurrence" that takes a Dynamic array and an integer as parameters and returns index of the last occurrence of this integer

Note : This should be repeated till the use doesn't enter "y" .
Use dynamic arrays and No global variables

Sample run:

Please Enter size of the array: 4
Please Enter Values in the array: 10 20 5 20
Enter The number you are searching for:20
The number is last shown in Index :3
Do you want to Continue(y/n) ? n

Question 7:

Write a program that swaps two rows in a matrix, the program should ask the user to enter the number of columns and rows in a 2D array. Then it asks to enter the two indices to swap the two rows. The array should be a dynamic array.

Use Function:

```
void input(int** arr, int rows, int cols);
void output(int** arr, int rows, int cols);
Note: No global variables.
```
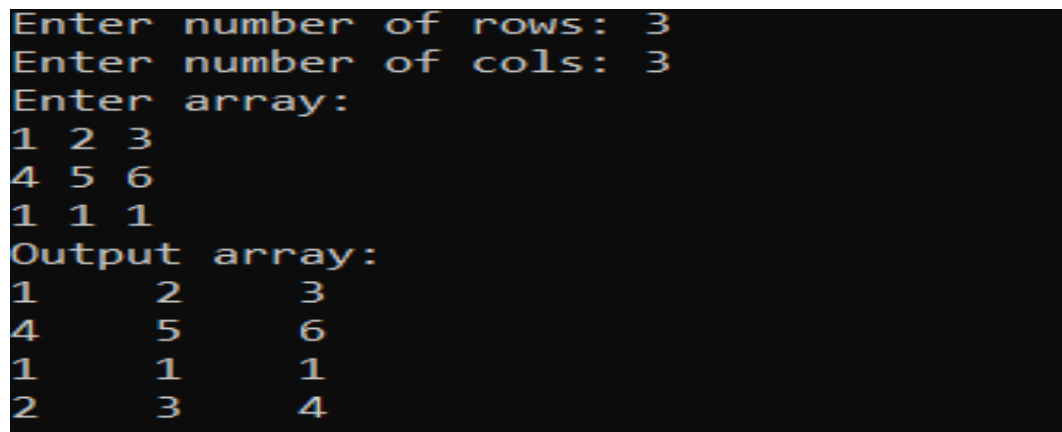
```
Enter number of rows: 3
Enter number of cols: 3
Enter array:
1 2 3
4 5 6
7 8 9
Enter first row index: 1
Enter second row index: 2
Output array:
1    2    3
7    8    9
4    5    6
```

Question 8:

Write a program that sums the first and last row in a matrix and add the summation as values for one last new row, the program should ask the user to enter the number of rows and columns in a 2D array. The array should be a dynamic array.

Use Function:

```
void input(int** arr, int rows, int cols);
       void output(int** arr, int rows, int cols);
       Note: No global variables.
```

```
Enter number of rows: 3
Enter number of cols: 3
Enter array:
1 2 3
4 5 6
1 1 1
Output array:
1      2      3
4      5      6
1      1      1
2      3      4
```