KIIT DEEMED TO BE UNIVERSITY

ASSIGNMENT-1

DSA LAB

SUBMITTED BY

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SUBMITTED TO

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July 27, 2022

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Question No. 1

PSEUDOCODE

```
/*
Lab Assignment
/1/
WAP to find out the smallest and largest element stored in an array
of n
integers.
*/

#include<stdio.h>

int main()
{
int a[50],i,n,large,small;
printf("Number of elements:");
scanf("%d",&n);
printf("Enter the Array:");

for(i=0;i<n;++i)
scanf("%d",&a[i]);
large=small=a[0];
for(i=1;i<n;++i)
{
if(a[i]>large)
large=a[i];
if(a[i]<small)
small=a[i];
}
printf("The largest element is %d",large);
printf("\nThe smallest element is %d",small);

return 0;
}
```

OUTPUT 1

```
Number of elements:7
Enter the Array:2 5 7 9 34 22 5
The largest element is 34
The smallest element is 2
```

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Question No. 2

PSEUDOCODE

```
/*
Lab Assignment
/2/
WAP to reverse the contents of a dynamic array of n elements.
*/
#include<stdio.h>
#include<stdlib.h>
int main()
{
	int *p,n,i;
	printf("How many numbers you want to enter: ");
	scanf("%d",&n);
	p=(int*)malloc(n * sizeof(int));
	printf("\nEnter %d Numbers:\n\n",n);
	for(i=0;i<n;i++)
	{
		scanf("%d",p+i);
	}
	printf("\nArray in Reverse Order: \n\n");
	for(i=n-1;i>=0;i--)
	{
		printf(" %d",*(p+i));
	}
	return 0;
}
```

OUTPUT 2

```
How many numbers you want to enter: 8

Enter 8 Numbers:

5 6 2 4 11 34 56 4

Array in Reverse Order:

 4 56 34 11 4 2 6 5
```

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Question No. 3

PSEUDOCODE

```
/*
Lab Assignment
/3/
WAP to search an element in a dynamic array of n numbers.
*/
#include <stdio.h>
#define MAX_SIZE 100  // Maximum array size

int main()
{
    int arr[MAX_SIZE];
    int size, i, toSearch, found;

    printf("Enter size of array: ");
    scanf("%d", &size);
    printf("Enter elements in array: ");
    for(i=0; i<size; i++)
    {
        scanf("%d", &arr[i]);
    }
    printf("\nEnter element to search: ");
    scanf("%d", &toSearch);

    found = 0;

    for(i=0; i<size; i++)
    {

        if(arr[i] == toSearch)
        {
            found = 1;
            break;
        }
    }
    if(found == 1)
    {
        printf("\n%d is found at position %d", toSearch, i + 1);
    }
    else
    {
        printf("\n%d is not found in the array", toSearch);
    }

    return 0;
}
```

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OUTPUT 3

```
Enter size of array: 7
Enter elements in array: 3 4 5 8 11 33 9

Enter element to search: 5

5 is found at position 3
```

Question No. 4

PSEUDOCODE

```
/*
Lab Assignment
/Q4/
WAP to sort a dynamic array of n numbers.
 */
#include<stdio.h>
#include<stdlib.h>
int main()
{
	int *a,n,i,j,t;
	printf("How many numbers you want to be sorted: ");
	scanf("%d",&n);
	a=(int *)malloc(n *sizeof(int));
	printf("\nEnter %d Numbers: \n\n",n);
	for(i=0;i<=n-1;i++)
	{
		scanf("%d", (a+i));
	}
	for(i=0;i<n;i++)
	{
		for(j=0;j<=i;j++)
		{
			if(*(a+i)<*(a+j))
			{
				t=*(a+i);
				*(a+i)=*(a+j);
				*(a+j)=t;
			}
		}
	}
	printf("\nSorting in Ascending Order: \n");
	for(i=0;i<n;i++)
	printf("\n%d",*(a+i));
	return 0;
}
```

OUTPUT 4

```
How many numbers you want to be sorted: 6

Enter 6 Numbers:

3 4 6 7 2 11

Sorting in Ascending Order:

2
3
4
6
7
11
```

Question No. 5

PSEUDOCODE

```c
/*
Lab Assignment
/Q5/
Given an unsorted dynamic array of size n, WAP to find and display
the number of elements between two elements a and b (both
inclusive). E.g. Input : arr = [1, 2, 2, 7, 5, 4], a=2 and b=5,
Output : 4 and the number are: 2, 2, 5, 4.
*/
#include <stdio.h>

int main()
{
    int n,i,a,b,c=0,d=2;
    printf("Enter size of array: ");
    scanf("%d",&n);
    printf("Enter elements of array: ");

    int arr[n];

    for(i=0;i<n;i++){
        scanf("%d",&arr[i]);
    }
```

```
    printf("\nEnter lower limit element & upper limit element
respectively: ");
    scanf("%d %d",&a,&b);

    for(i=0;i<n;i++){
        if(arr[i]==a || arr[i]==b){
            c++;
            d=0;
        }

        if(arr[i]>a && arr[i]<b){
            c++;
        }
    }
    printf("Number of elements in between two elements (Both
Inclusive) = %d",c+d);

    return 0;
}
```

OUTPUT 5

```
Enter size of array: 6
Enter elements of array: 1 2 2 7 5 4


Enter lower limit element & upper li
mit element respectively: 2 5
Number of elements in between two el
ements (Both Inclusive) = 4
```

Question No. 6

PSEUDOCODE

```
/*
Lab Assignment
/Q6/
Given a dynamic array, WAP to print the next greater element (NGE)
for every element. The next greater element for an element x is the
first greater element on the right side of x in array. Elements for
which no greater element exist, consider next greater element as -1.
E.g. For the input array [2, 5, 3, 9, 7], the next greater elements
for each elements are as follows.
Element NGE
```

```
2       5
5       9
3       9
9       -1
7 -     1
*/
#include<stdio.h>
void printNGE(int arr[], int n)
{
    int next, i, j;
    for (i=0; i<n; i++)
    {
        next = -1;
        for (j = i+1; j<n; j++)
        {
            if (arr[i] < arr[j])
            {
                next = arr[j];
                break;
            }
        }
        printf("\t%d\t|\t %d\n", arr[i], next);
    }
}
int main()
{
    int arr[]= {2,5,3,9,7};
    int n = sizeof(arr)/sizeof(arr[0]);
    printf("\n\n\tElement\t|\tNGE\n");
    printf("\t------------------\n");
    printNGE(arr, n);
    printf("\n");
    return 0;
}
```

OUTPUT 6

```
   Element |       NGE
   ------------------
   2       |         5
   5       |         9
   3       |         9
   9       |         -1
   7       |         -1
```

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Question No.7

PSEUDOCODE

```
/*
Lab Assignment
/Q7/ Let A be nXn square dynamic matrix. WAP by using appropriate
user defined functions for the following:
a) Find the number of nonzero elements in A
b) Find the sum of the elements above the leading diagonal.
c) Display the elements below the minor diagonal.
d) Find the product of the diagonal elements.*/

#include <stdio.h>
#include <stdlib.h>
void non(int **arr, int n)
{
    int non = 0;
    for (int i = 0; i < n; i++)
    {
        for (int j = 0; j < n; j++)
        {
            if (arr[i][j] != 0)
            {
                non++;
            }
        }
    }
    printf("\nThe number of nonzero elements is %d\n", non);
}
void sum(int **arr, int n)
{
    int sum = 0;
    for (int i = 0; i < n; i++)
    {
        for (int j = i + 1; j < n; j++)
        {
            sum = sum + arr[i][j];
        }
    }
    printf("\nThe sum of the elements above the leading diagonal is
%d\n",sum);
}
void minor(int **arr, int n)
{
    int sum = 0;
    int f = n-2;
    printf("\nThe elements below the minor diagonal are \n");
    for (int i = 1; i <n;i++)
```

```
    {
        for (int j = n-1; j >f;j--)
        {
            printf("%d ",arr[i][j]);
        }
        f--;
    }
}
void product(int **arr, int n)
{
    int k = 1;
    for (int i = 0; i < n;i++)
    {
        for (int j = i; j == i;j++)
        {
            k = k * arr[i][j];
        }
    }
    printf("\n\nThe product of the diagonal elements is %d\n", k);
}
int main()
{
    int n, i, j;
    int **arr;
    printf("\nEnter the size of the  square matrix A[ n x n ]\n");
    scanf("%d", &n);
    arr = (int **)malloc(n * sizeof(int *));
    for (i = 0; i < n; i++)
    {
        arr[i] = (int *)malloc(n * sizeof(int));
    }
    int g = 1;
    for (i = 0; i < n; i++)
    {
    printf("Enter %d Element in Row %d\n", n,(g++));
    for (j = 0; j < n; j++)
    {
        scanf("%d", &arr[i][j]);
        }
    }
    printf("\n");
    printf("The Matrix is\n");
    for (i = 0; i < n; i++)
    {
        for (j = 0; j < n; j++)
        {
            printf("%d ", arr[i][j]);
        }
```

```
        printf("\n");
    }
    printf("\n");
    non(arr, n);
    sum(arr, n);
    minor(arr, n);
    product(arr, n);
    return 0;
}
```

OUTPUT 7

```
Enter the size of the  square matrix A[ n x n ]
1 2
Enter 2 Element in Row 2
3 4

The Matrix is
1 2
3 4


The number of nonzero elements is 4

The sum of the elements above the leading diagonal is 2

The elements below the minor diagonal are
4

The product of the diagonal elements is 4
```

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HOME ASSIGNMENT

Question No.1

PSEUDOCODE

```
/*
Home Assignment
/1/
Given an unsorted dynamic array arr and two numbers x and y, find
the minimum distance between x and y in arr. The array might also
contain duplicates. You may assume that both x and y are different
and present in arr. Input: arr[] = {3, 5, 4, 2, 6, 5, 6, 6, 5, 4, 8,
3}, x = 3, y = 6
*/
#include <stdio.h>
#include <stdlib.h>
#include <limits.h>
int minDist(int arr[], int n, int x, int y)
{
   int i, j;
   int min_dist = INT_MAX;
   for (i = 0; i < n; i++)
   {
     for (j = i+1; j < n; j++)
     {
         if( (x == arr[i] && y == arr[j] ||
              y == arr[i] && x == arr[j]) && min_dist > abs(i-j))
         {
              min_dist = abs(i-j);
         }
     }
   }
   return min_dist;
}
int main()
{
    int arr[] = {3, 5, 4, 2, 6, 5, 6, 6, 5, 4, 8, 3};
    int n = sizeof(arr)/sizeof(arr[0]);
    int x = 3;
    int y = 6;
    printf("Minimum distance between %d and %d is %d", x,
y,minDist(arr, n, x, y));
    return 0;
}
```

OUTPUT 1

```
Minimum distance between 3 and 6 is 4
```

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Question No.2

PSEUDOCODE

```
/*
Home Assignment
/2/
WAP to find out the second smallest and second largest element stored in
a dynamic array.
*/
#include <stdio.h>

int main()
{
    int n;
    printf("Enter the number of elements:");
    scanf("%d",&n);
    printf("Enter the array elements :");
    int a[n];
    for(int i=0;i<n;i++)
    {
        scanf("%d",&a[i]);
    }
    for(int i=0;i<n;i++)
    {
        int temp;
        for(int j=i+1; j<n ;j++)
        {
            if(a[i]<a[j])
            {
                temp=a[i];
                a[i]=a[j];
                a[j]=temp;
            }
        }
    }
    printf("The Second Smallest element is %d",a[n-2]);
    printf("\n");
    printf("The Second Largest element is %d",a[1]);
    return 0;
}
```

OUTPUT 2

```
Enter the number of elements:7
Enter the array elements :2 3 1 6 0 9 11
The Second Smallest element is 1
The Second Largest element is 9
```

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Question No.3

PSEUDOCODE

```
/*
Home Assignment
/3/
WAP to arrange the elements of a dynamic array such that all even
numbers are followed by all odd numbers.
*/
#include <stdio.h>
 int main()
{
    int a[10000],b[10000],i,n,j,k,temp,c=0;

    printf("Enter size of the  array : ");
    scanf("%d", &n);
    printf("Enter elements in array : \n");
    for(i=0; i<n; i++)
    {
        scanf("%d",&a[i]);
        if(a[i]%2==1)
         c++;
    }
    for(i=0; i<n-1; i++)
    {

        for(j=0; j<n-i-1; j++)
        {
           if(a[j]>a[j+1])
           {
            temp=a[j];
            a[j]=a[j+1];
            a[j+1]=temp;
           }

        }

    }

    k=0;
    j=n-c;

    for(i=0; i<n; i++)
    {
        if(a[i]%2==0)
        {
            if(k<n-c)
              b[k++]=a[i];
```

```
        }
        else
        {
            if(j<n)
              b[j++]=a[i];
        }
    }
    printf("\nThe elements of a dynamic array such that all\neven
numbers are followed by all odd numbers are:\n\n");
    for(i=0; i<n; i++)
    {
        a[i]=b[i];
       printf("%d ",a[i]);
    }
    printf("\n");
}
```

OUTPUT 3

```
Enter size of the  array : 6
Enter elements in array : 3 4 5 7 3 1 2

The elements of a dynamic array such that all
even numbers are followed by all odd numbers are:

4 1 3 3 5 7
```

Question No.4

PSEUDOCODE

```
/*
Home Assignment
/4/
Write a program to replace every element in the dynamic array with
the
next greatest element present in the same array.
*/
#include<stdio.h>
#include<stdlib.h>
int main()
{
    int *a,n,i,j,max;
    printf("Enter size of array:");
    scanf("%d",&n);
```

```
    a=malloc(sizeof(int)*n);

    printf("Enter %d Elements:",n);
    for(i=0;i<n;i++)
    {
        scanf("%d",&a[i]);
    }

    for(i=0;i<n-1;i++)
    {
        max=a[i+1];
        for(j=i+2;j<n;j++)
        {
            if(a[j]>max)
            {
                max=a[j];
            }
        }
        a[i]=max;
    }
    printf("Output Result :\n");
    for(i=0;i<n;i++)
    {
        printf("%d ",a[i]);
    }
    return 0;

}
```

OUTPUT 4

```
Enter size of array:7
Enter 7 Elements:1 2 3 4 5 6 7
Output:
7 7 7 7 7 7 7
```

```
Enter size of array:6
Enter 6 Elements:1 2 6 3 9 5
Output:
9 9 9 9 5 5
```

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Question No.5

PSEUDOCODE

```
/*
Home Assignment
/5/
WAP to replace every dynamic array element by multiplication of
previous
and next of an n element.*/
#include<stdio.h>
void newArryPrevNext(int arr1[], int n)
{
    if (n <= 1)
      return;
    int pre_elem = arr1[0];
    arr1[0] = arr1[0] * arr1[1];
    for (int i=1; i<n-1; i++)
    {
        int cur_elem = arr1[i];
        arr1[i] = pre_elem * arr1[i+1];
        pre_elem = cur_elem;
    }
    arr1[n-1] = pre_elem * arr1[n-1];
}
int main()
{
    int arr1[] = {1,2, 3, 4, 5, 6};
    int n = sizeof(arr1)/sizeof(arr1[0]);
  int i = 0;
  printf("The given array is:  \n");
  for(i = 0; i < n; i++)
    {
      printf("%d  ", arr1[i]);
    }
    printf("\n");
  printf("The new array is: \n");
    newArryPrevNext(arr1, n);
    for (int i=0; i<n; i++)
      printf("%d ", arr1[i]);
    return 0;
}
```

OUTPUT 5

```
The given array is:
1  2  3  4  5  6
The new array is:
2 3 8 15 24 30
```

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Question No.6

PSEUDOCODE

```
/*
Home Assignment
/6/
WAP to sort rows of a dynamic matrix having m rows and n columns in
ascending and columns in descending order.
*/

#include <stdio.h>

void main()
{
    static int array1[10][10], array2[10][10];
    int i, j, k, a, m, n;

    printf("Enter the order of the matrix \n");
    scanf("%d %d", &m, &n);
    printf("Enter co-efficients of the matrix \n");
    for (i = 0; i < m; ++i)
    {
        for (j = 0; j < n; ++j)
        {
            scanf("%d", &array1[i][j]);
            array2[i][j] = array1[i][j];
        }
    }
    printf("The given matrix is \n");
    for (i = 0; i < m; ++i)
    {
        for (j = 0; j < n; ++j)
        {
                printf(" %d", array1[i][j]);
        }
        printf("\n");
    }
    printf("After arranging rows in ascending order\n");
    for (i = 0; i < m; ++i)
    {
        for (j = 0; j < n; ++j)
        {
            for (k =(j + 1); k < n; ++k)
            {
                if (array1[i][j] > array1[i][k])
                {
                    a = array1[i][j];
                    array1[i][j] = array1[i][k];
```

```
                    array1[i][k] = a;
                }
            }
        }
    }
    for (i = 0; i < m; ++i)
    {
        for (j = 0; j < n; ++j)
        {
            printf(" %d", array1[i][j]);
        }
        printf("\n");
    }
    printf("After arranging the columns in descending order \n");
    for (j = 0; j < n; ++j)
    {
        for (i = 0; i < m; ++i)
        {
            for (k = i + 1; k < m; ++k)
            {
                if (array2[i][j] < array2[k][j])
                {
                    a = array2[i][j];
                    array2[i][j] = array2[k][j];
                    array2[k][j] = a;
                }
            }
        }
    }
    for (i = 0; i < m; ++i)
    {
        for (j = 0; j < n; ++j)
        {
            printf(" %d", array2[i][j]);
        }
        printf("\n");
    }
}
```

OUTPUT 6

```
Enter the order of the matrix
2 2
Enter co-efficients of the matrix
1 2 3 4
The given matrix is
 1 2
 3 4
After arranging rows in ascending order
 1 2
 3 4
After arranging the columns in descending order
 3 4
 1 2
```

Question No.7

PSEUDOCODE

```
/*
Home Assignment
/7/
WAP to find out the kth smallest and kth largest element stored in a
dynamic array of n integers, where k<n.
*/
#include<stdio.h>

void find(int a[20],int n,int k,int l)
{
    int i,j,t;
    for(i=0;i<n;i++)
    {
        for(j=0;j<n-i-1;j++)
        {
            if(a[j]>a[j+1])
            {
                t=a[j];
                a[j]=a[j+1];
                a[j+1]=t;
            }
        }
    }
    printf("The sorted list is: ");
```

```
    for(i=0;i<n;i++)
        printf("%d ",a[i]);
    if(l==1)
    {
        for(i=n-1;i>=n-k;i--);
        printf("\nThe %dth largest element is: %d",k,a[i+1]);
    }
    else
    {
        for(i=0;i<k;i++);
        printf("\nThe %dth smallest element is: %d",k,a[i-1]);
    }
}
int main()
{
    int i,n,a[20],k,l;
    printf("Enter the number of elements: ");
    scanf("%d",&n);
    printf("Enter the array elements: ");
    for(i=0;i<n;i++)
        scanf("%d",&a[i]);
    printf("Enter the value of k: ");
    scanf("%d",&k);
    printf("Enter 1 for kth largest or 0 for kth smallest: ");
    scanf("%d",&l);
    find(a,n,k,l);
}
```

OUTPUT 7

```
Enter the number of elements: 5
Enter the array elements: 1 2 3 4 5
Enter the value of k: 3
Enter 1 for kth largest or 0 for kth smallest: 1
The sorted list is: 1 2 3 4 5
The 3th largest element is: 3
```

```
Enter the number of elements: 5
Enter the array elements: 1 2 3 4 5
Enter the value of k: 4
Enter 1 for kth largest or 0 for kth smallest: 0
The sorted list is: 1 2 3 4 5
The 4th smallest element is: 4
```

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Question No.8

PSEUDOCODE

```
/*
Home Assignment
/8/
WAP to find the largest number and counts the occurrence of the
largest
number in a dynamic array of n integers using a single loop.
*/
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include <math.h>
#include <ctype.h>
int main()
{
int arrayNum[15];
int a;
int max=0;
int location;
for( a=0; a < 15; a++)
    {
        printf("Enter element %d:", a);
        scanf("%d",&arrayNum[a]);
    }

for(a=0; a < 15; a++)
    {
        printf("%d\n", arrayNum[a]);
    }

for (a = 1; a < 15; a++)
  {
    if (arrayNum[a] > max)
    {
       max  = arrayNum[a];
       location = a+1;
    }
    }
printf("Max element in the array in the location %d and its value
%d\n", location, max);
int NoOfOccurances;
NoOfOccurances = 0;
for(a=0; a<15; a++)
    {
        if(max == arrayNum[a])
        {
```

```
                NoOfOccurances++;
            }

        }

 printf("Number %d: %d occurences\n", max,NoOfOccurances);
return 0;
}
```

OUTPUT 8

```
Enter element 0:1
Enter element 1:2
Enter element 2:3
Enter element 3:4
Enter element 4:5
Enter element 5:5
Enter element 6:6
Enter element 7:6
Enter element 8:6
Enter element 9:7
Enter element 10:8
Enter element 11:9
Enter element 12:10
Enter element 13:11
Enter element 14:12
1
2
3
4
5
5
6
6
6
7
8
9
10
11
12
Max element in the array in the location
 15 and its value 12
```

Question No.9

PSEUDOCODE

```
/*
Home Assignment
/9/
You are given an array of 0s and 1s
```

```
in random order. Segregate 0s on left
side and 1s on right side of the array. Traverse array only once.
*/
#include<stdio.h>

void segregate0and1(int arr[], int size)
{
    int left = 0, right = size-1;

    while (left < right)
    {
        while (arr[left] == 0 && left < right)
            left++;

        while (arr[right] == 1 && left < right)
            right--;
        if (left < right)
        {
            arr[left] = 0;
            arr[right] = 1;
            left++;
            right--;
        }
    }
}
int main()
{
    int arr[] = {0, 1, 0, 1, 1, 1};
    int i, arr_size = sizeof(arr)/sizeof(arr[0]);

    segregate0and1(arr, arr_size);

    printf("Array after segregation ");
    for (i = 0; i < 6; i++)
        printf("%d ", arr[i]);

    getchar();
    return 0;
}
```

OUTPUT 9

```
Array after segregation 0 0 1 1 1 1
```

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Question No.10

PSEUDOCODE

```
/*
Home Assignment
/10/
WAP to swap all the elements in the 1st column with all the
corresponding elements in the last column, and 2nd column with the
second last column and 3rd with 3rd last etc. of a 2-D dynamic
array. Display the matrix.
*/
#define _CRT_SECURE_NO_WARNINGS
#include <stdio.h>
#include <stdlib.h>
void InpMat(int** mat, int rows, int cols)//
{
    printf("Please enter elements matrix:\n");
    for (int i = 0; i < rows; i++)
    {
        for (int j = 0; j < cols; j++)
            scanf("%i", &mat[i][j]);
    }
}
void OutMat(int** mat, int rows, int cols)//
{
    printf("Final Matrix is \n");
    for (int i = 0; i < rows; i++)
    {
        for (int j = 0; j < cols; j++)
            printf("%3d", mat[i][j]);
        printf("\n");
    }
}
void ChangeMat(int** mat, int rows, int cols)
{
    int l = 0;
    int r = cols-1;
    while (l < r)
    {
        for (int i = 0; i < rows; i++)
        {
            int temp = mat[i][l];
            mat[i][l] = mat[i][r];
            mat[i][r] = temp;
        }
        l++;
        r--;
    }
```

```
}
int main()
{
    int rows, cols;
    printf("Please enter rows and columns of matrix:\n");
    scanf("%i%i", &rows, &cols);
    int** mat = (int**)malloc(sizeof(int*) * (size_t)rows);
    for (int i = 0; i < rows; i++)
        mat[i] = (int*)malloc(sizeof(int) * (size_t)cols);
    InpMat(mat, rows, cols);
    ChangeMat(mat, rows, cols);
    OutMat(mat, rows, cols);
    free(mat);
    return 0;
}
```

OUTPUT 10

```
Please enter rows and columns of matrix:
2 2
Please enter elements matrix:
1 2 3 4
Final Matrix is
  2  1
  4  3
```

Question No.11 is repeated question of question no.3.

Thank You
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