Data Structure lab assignment 1

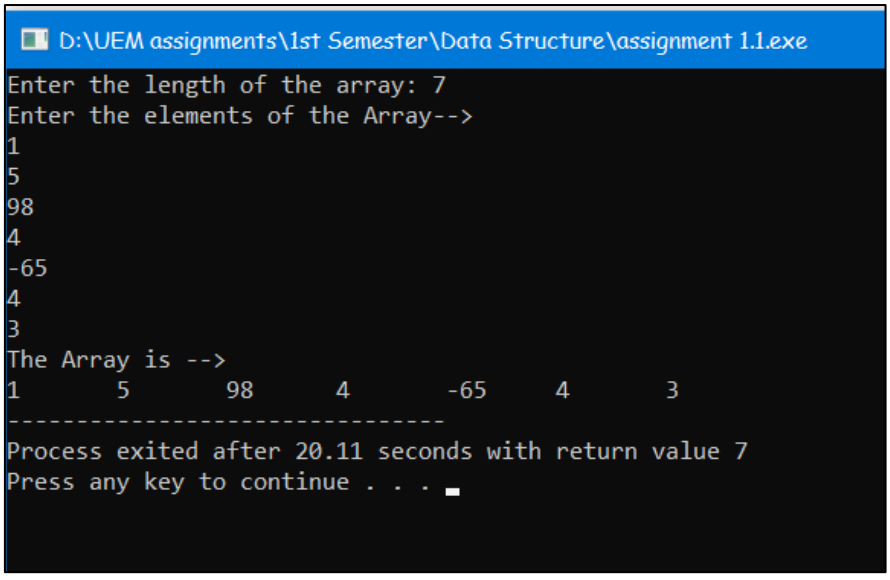
Problem No: 1

Problem Statement: Write a C program to print an array.

Source Code:

```
#include<stdio.h>
int main () {
    int n, i;
    printf("Enter the length of the array: ");
    scanf("%d", &n);
    int arr[n];
    printf("Enter the elements of the Array-->\n");
    for (i = 0; i < n; i++)
        scanf("%d", &arr[i]);
    printf("The Array is -->\n");
    for (i = 0; i < n; i++)
        printf("%d\t", arr[i]);
}
```

Output:



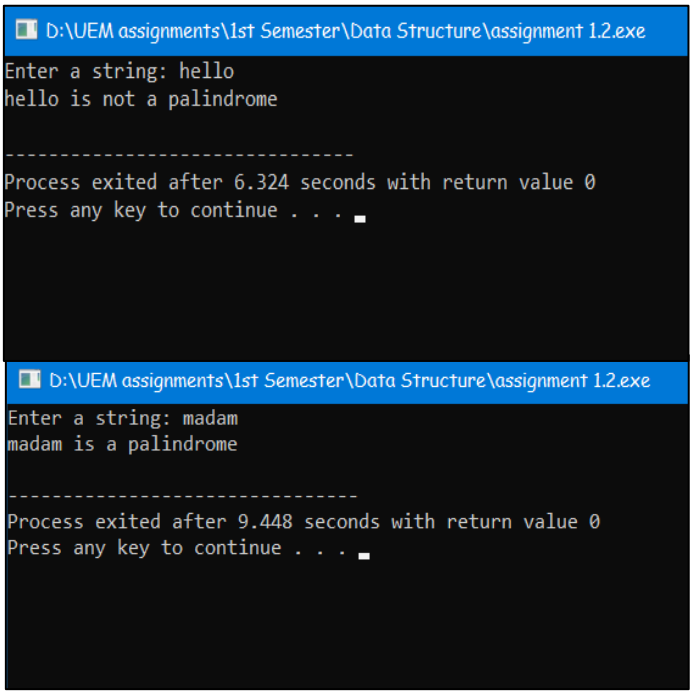
Problem No: 2

Problem Statement: Write a C program to check whether a given string is Palindrome or not.

Source Code:

```
#include<stdio.h>
#include<string.h>
int main() {
	char str[100];
	int l = 0, h;
	printf("Enter a string: ");
	gets(str);
	h = strlen(str) - 1;
	while (h > l) {
		if (str[l++] != str[h--]) {
			printf("%s is not a palindrome\n", str);
			return 0;
		}
	}
	printf("%s is a palindrome\n", str);
	return 0;
}
```

Output:



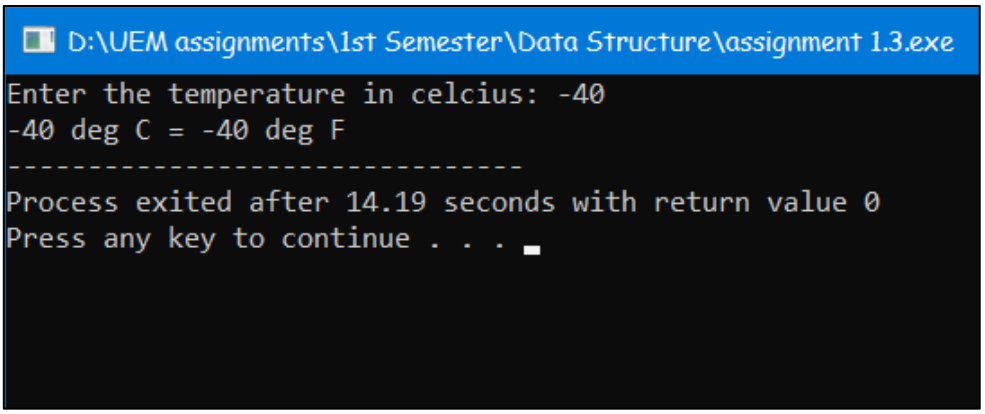
Problem No: 3

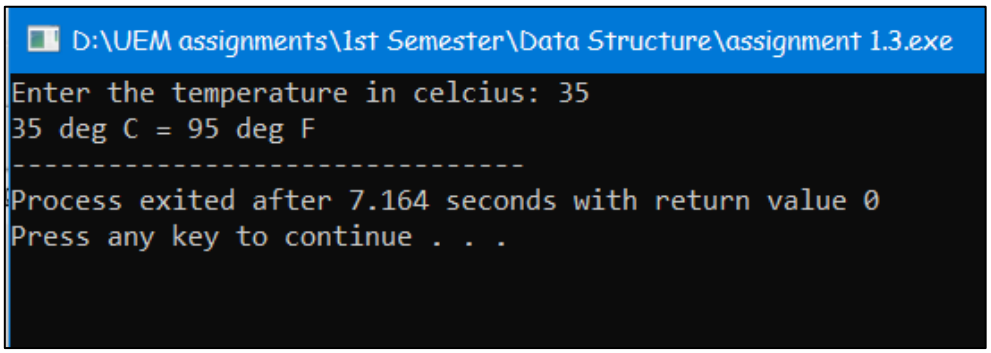
Problem Statement: Write a C program to convert temperature from degree Centigrade to Fahrenheit.

Source Code:

```
#include<stdio.h>
int main () {
	int tc, tf;
	printf("Enter the temperature in celcius: ");
	scanf("%d", &tc);
	tf = (tc * 9 / 5) + 32;
	printf("%d deg C = %d deg F", tc, tf);
	return 0;
}
```

Output:





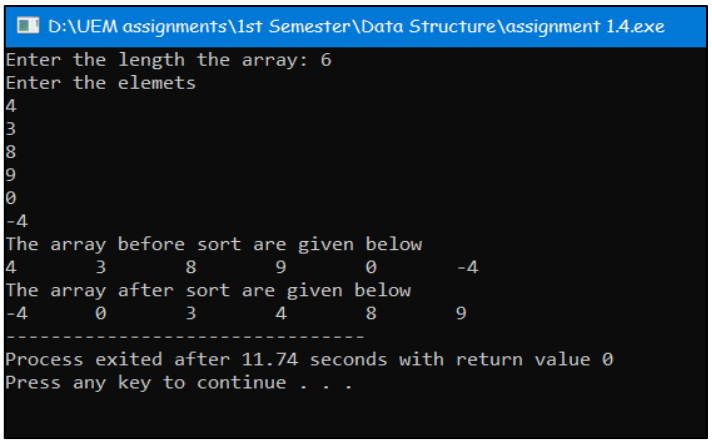
Problem No: 4

Problem Statement: Write a C program to sort an array.

Source Code:

```
#include <stdio.h>
int main() {
    int i, j, temp, len;
    printf("Enter the length the array: ");
    scanf("%d", &len);
    int arr[len];
    printf("Enter the elemets \n");
    for (i = 0; i < len; i++)
        scanf("%d", &arr[i]);
    printf("The array before sort are given below \n");
    for (i = 0; i < len; i++)
        printf("%d\t", arr[i]);
    for (i = 0; i < len; i++)
        for (j = i + 1; j < len; j++)
            if (arr[i] > arr[j]) {
                temp =  arr[i];
                arr[i] = arr[j];
                arr[j] = temp;
            }
    printf("\nThe array after sort are given below \n");
    for (i = 0; i < len; i++)
        printf("%d\t", arr[i]);
      return 0;
}
```

Output:



Problem No: 5

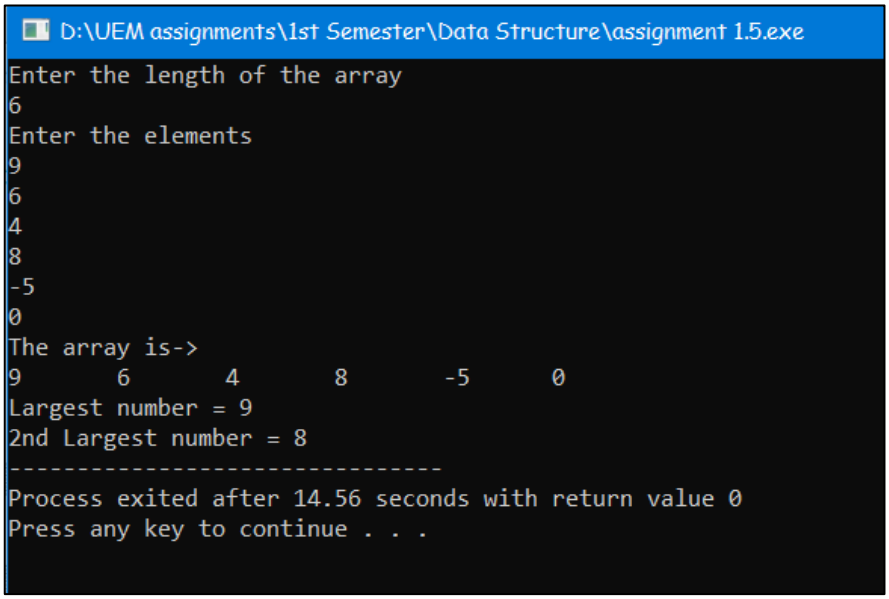
Problem Statement: Write a C program to print the largest and second largest element of the array.

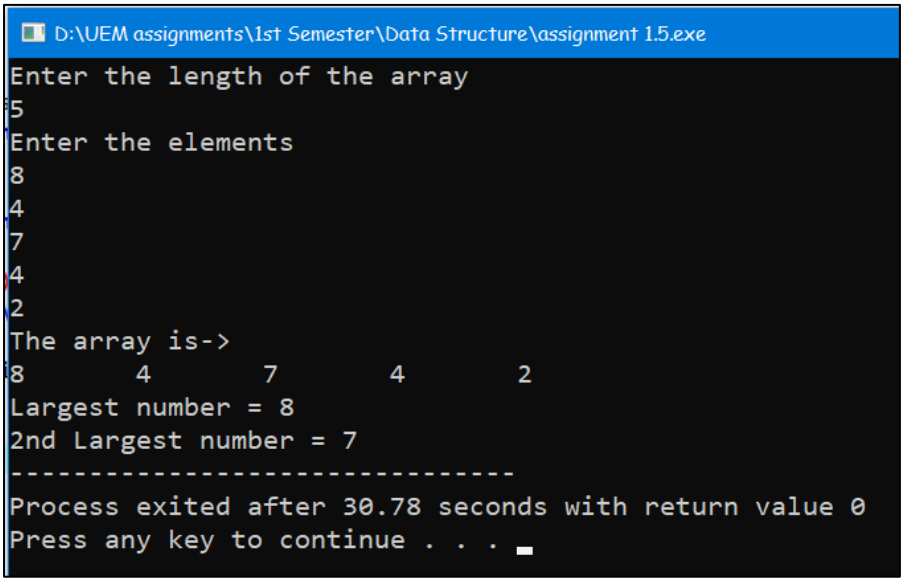
Source Code:

```
#include <stdio.h>
int main() {
    int n, max, max2, i, has_max2 = 0;
    printf("Enter the length of the array \n");
    scanf("%d", &n);
    int arr[n];
    printf("Enter the elements \n");
    for (i = 0; i < n; i++)
        scanf("%d", &arr[i]);
    printf ("The array is->\n");
    for (i = 0; i < n; i++)
        printf("%d\t", arr[i]);
    max = arr[0];
    for (i = 0; i < n; i++) {
        if (max < arr[i]) {
            max2 = max;
            max = arr[i];
        }
    }
    for (i = 0; i < n; i++) {
        if (arr[i] < max) {
            if (!has_max2) {
                has_max2 = 1;
                max2 = arr[i];
            }
            else if (arr[i] > max2)
                max2 = arr[i];
        }
    }
    if (has_max2 == 1)
```

```
            printf("\nLargest number = %d\n2nd Largest number = %d", max,
max2);
      else
            printf("\nAll values are identical to %d", max);
      return 0;
      }
```

Output:





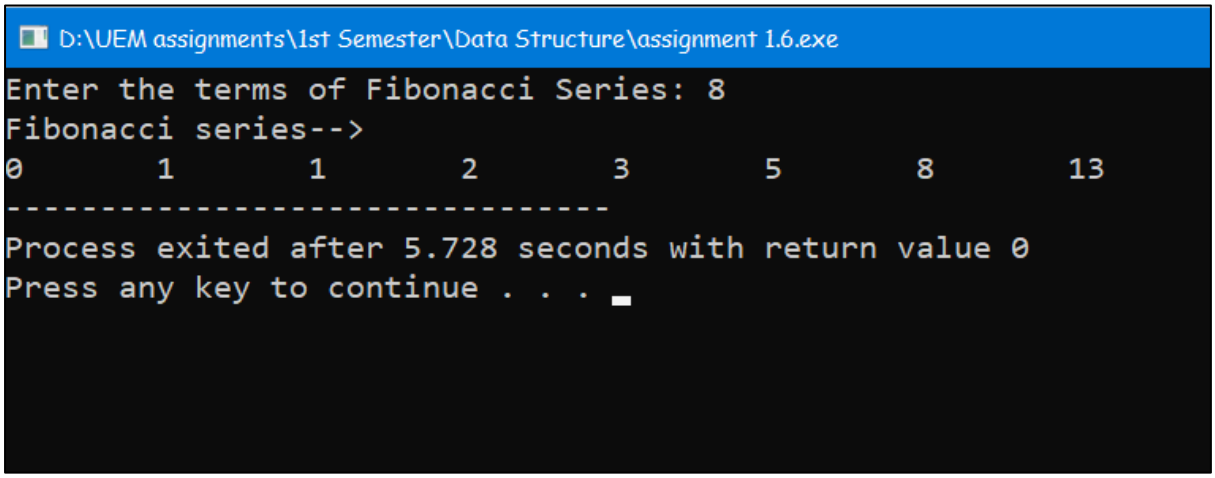
Problem No: 6

Problem Statement: Write a C program to display Fibonacci series.

Source Code:

```
#include <stdio.h>
int main() {
	int num, i, t1 = 0, t2 = 1, next = t1 + t2;
	printf("Enter the terms of Fibonacci Series: ");
	scanf("%d", &num);
	printf("Fibonacci series-->\n");
	printf("%d\t%d\t", t1, t2);
	for (i = 2; i < num; i++) {
		printf("%d\t", next);
		t1 = t2;
		t2 = next;
		next = t1 + t2;
	}
	return 0;
}
```

Output:



Problem No: 7

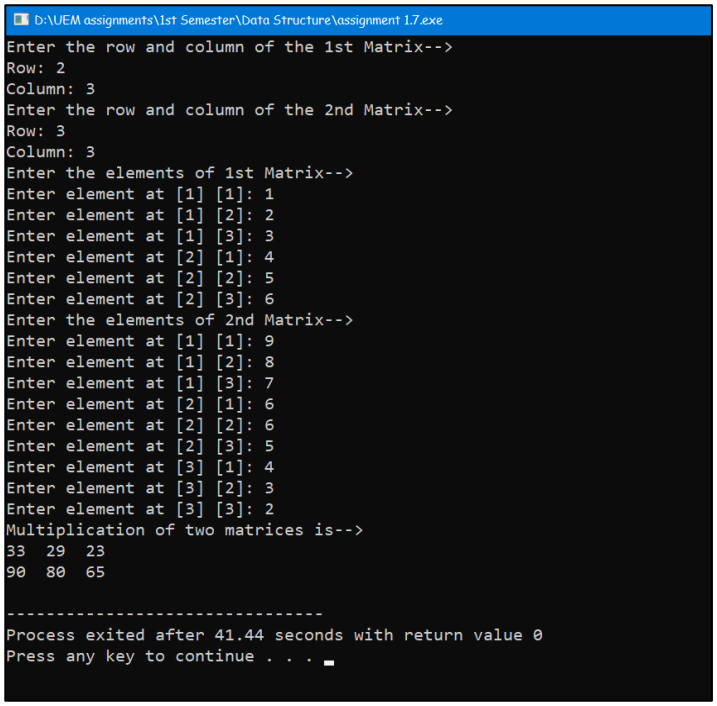
Problem Statement: Write a program that reads two 2D metrices from the console, verifies if metrics multiplication is possible or not. Then multiplies the metrices and prints the 3rd metrics.

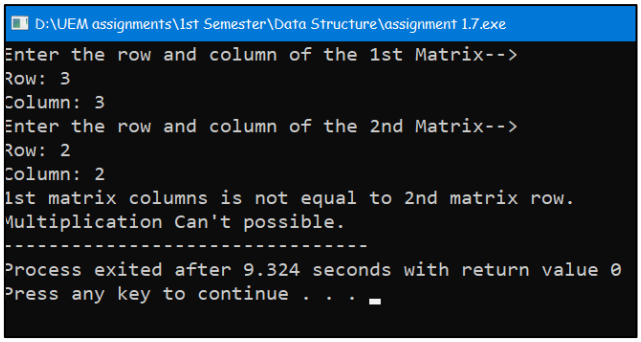
Source Code:

```
#include<stdio.h>
int main() {
	int row1, row2, column1, column2, i, j, k;
	printf("Enter the row and column of the 1st Matrix-->\n");
	printf("Row: ");
	scanf("%d", &row1);
	printf("Column: ");
	scanf("%d", &column1);
	printf("Enter the row and column of the 2nd Matrix-->\n");
	printf("Row: ");
	scanf("%d", &row2);
	printf("Column: ");
	scanf("%d", &column2);
	if (column1 != row2) {
		printf("1st matrix columns is not equal to 2nd matrix
row.\nMultiplication Can't possible.");
		return 0;
	}
	int matrix1 [row1][column1], matrix2 [row2][column2], result
[row1][column2];
	printf("Enter the elements of 1st Matrix-->\n");
	for (i = 0; i < row1; ++i)
		for (j = 0; j < column1; ++j) {
		printf("Enter element at [%d] [%d]: ", i + 1, j + 1);
		scanf("%d", &matrix1[i][j]);
		}
	printf("Enter the elements of 2nd Matrix-->\n");
	for (i = 0; i < row2; ++i)
	for (j = 0; j < column2; ++j) {
		printf("Enter element at [%d] [%d]: ", i + 1, j + 1);
		scanf("%d", &matrix2[i][j]);
```

```
    }
    for (i = 0; i < row1; ++i)
    for (j = 0; j < column2; ++j)
          result[i][j] = 0;
for (i = 0; i < row1; ++i)
    for (j = 0; j < column2; ++j)
          for (k = 0; k < column1; ++k)
                result[i][j] += matrix1[i][k] * matrix2[k][j];
 printf("Multiplication of two matrices is-->\n");
    for (i = 0; i < row1; i++) {
    for (j = 0; j < column2; j++)
          printf("%d  ", result[i][j]);
      printf("\n");
 }
    return 0;
}
```

Output:





Problem No: 8

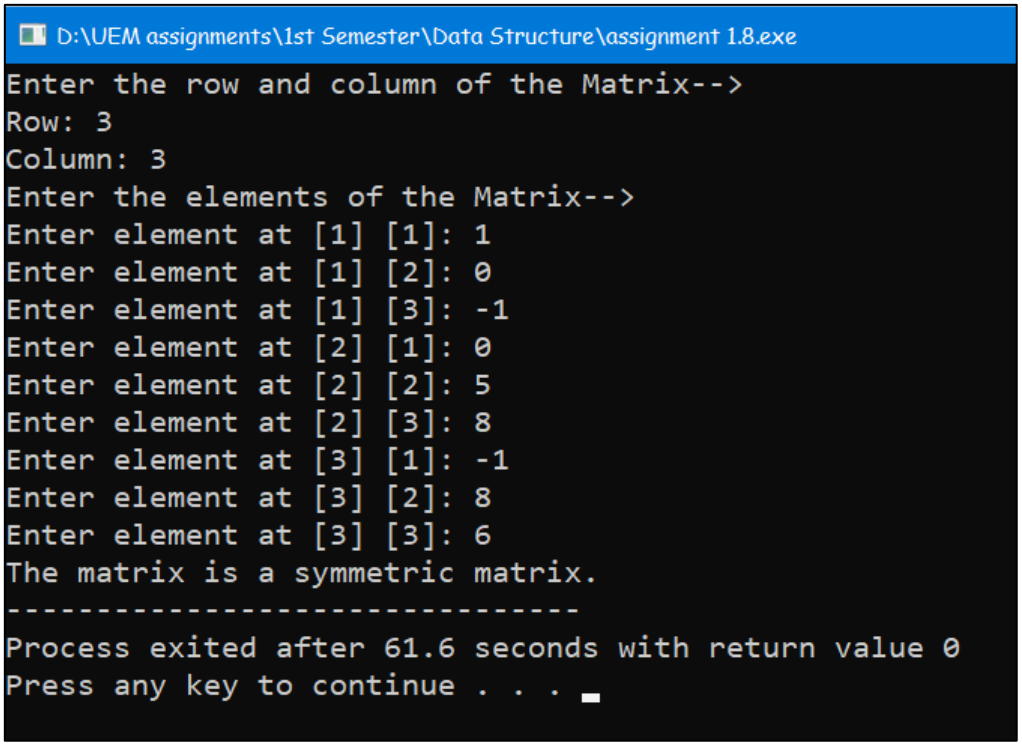
Problem Statement: Write a program that reads a 2D metrics and checks if the metrics is a symmetric metrics or not.

Source Code:

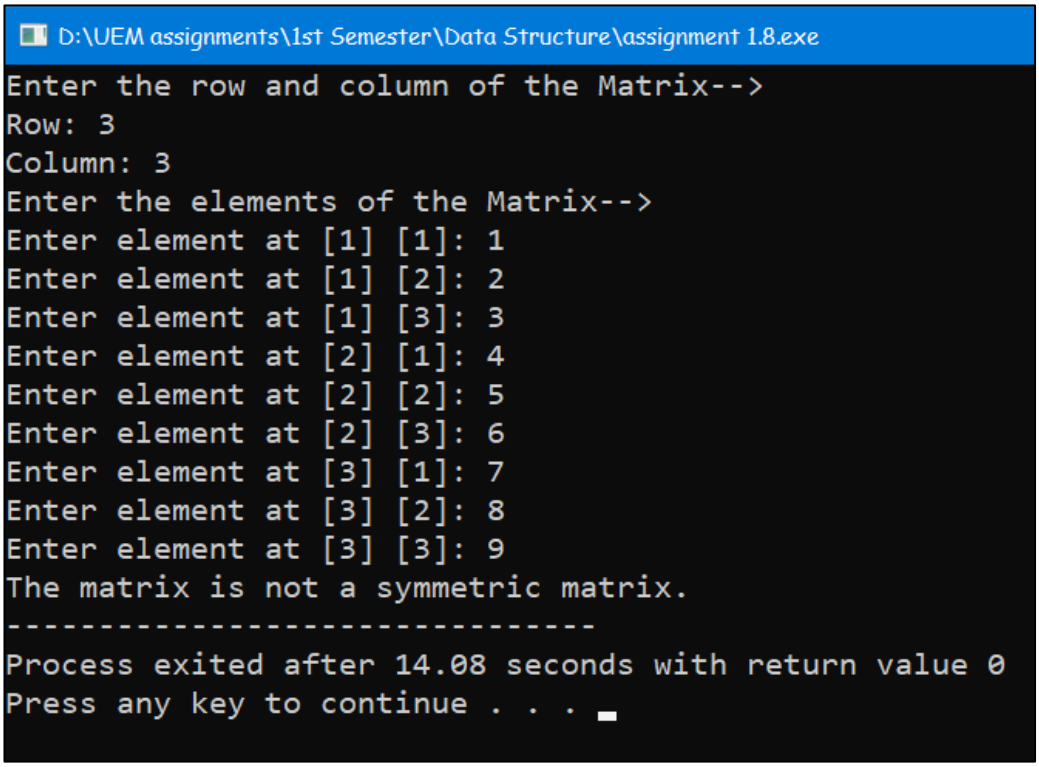
```
#include<stdio.h>
int main() {
      int row, column, i, j, flag = 0;
      printf("Enter the row and column of the Matrix-->\n");
      printf("Row: ");
      scanf("%d", &row);
      printf("Column: ");
      scanf("%d", &column);
      int matrix [row][column];
      printf("Enter the elements of the Matrix-->\n");
      for (i = 0; i < row; i++)
      for (j = 0; j < column; j++) {
            printf("Enter element at [%d] [%d]: ", i + 1, j + 1);
            scanf("%d", &matrix[i][j]);
      }
      for (i = 0; i < row; i++)
            for (j = 0; j < column; j++)
                  if (matrix [j][i] != matrix [i][j]) {
                        flag = 1;
                        break;
                  }

    if (flag == 0)
      printf("The matrix is a symmetric matrix.");
    else
      printf("The matrix is not a symmetric matrix.");
      return 0;
}
```

Output:


D:\UEM assignments\1st Semester\Data Structure\assignment 1.8.exe
Enter the row and column of the Matrix-->
Row: 3
Column: 3
Enter the elements of the Matrix-->
Enter element at [1] [1]: 1
Enter element at [1] [2]: 0
Enter element at [1] [3]: -1
Enter element at [2] [1]: 0
Enter element at [2] [2]: 5
Enter element at [2] [3]: 8
Enter element at [3] [1]: -1
Enter element at [3] [2]: 8
Enter element at [3] [3]: 6
The matrix is a symmetric matrix.

Process exited after 61.6 seconds with return value 0
Press any key to continue . . .


D:\UEM assignments\1st Semester\Data Structure\assignment 1.8.exe
Enter the row and column of the Matrix-->
Row: 3
Column: 3
Enter the elements of the Matrix-->
Enter element at [1] [1]: 1
Enter element at [1] [2]: 2
Enter element at [1] [3]: 3
Enter element at [2] [1]: 4
Enter element at [2] [2]: 5
Enter element at [2] [3]: 6
Enter element at [3] [1]: 7
Enter element at [3] [2]: 8
Enter element at [3] [3]: 9
The matrix is not a symmetric matrix.

Process exited after 14.08 seconds with return value 0
Press any key to continue . . .

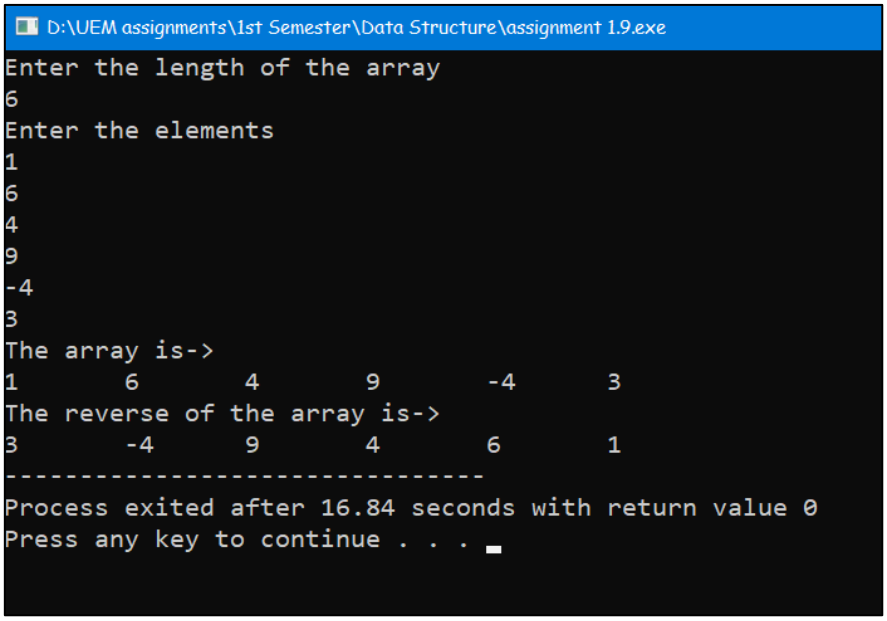
Problem No: 9

Problem Statement: Write a C program to print reverse array.

Source Code:

```
#include<stdio.h>
int main() {
     int len, i;
     printf("Enter the length of the array \n");
    scanf("%d", &len);
    int arr[len];
    printf("Enter the elements \n");
    for (i = 0; i < len; i++)
        scanf("%d", &arr[i]);
    printf ("The array is->\n");
    for (i = 0; i < len; i++)
        printf("%d\t", arr[i]);
    printf ("\nThe reverse of the array is->\n");
    for (i = len - 1; i >= 0; i--)
        printf("%d\t", arr[i]);
     return 0;
}
```

Output:



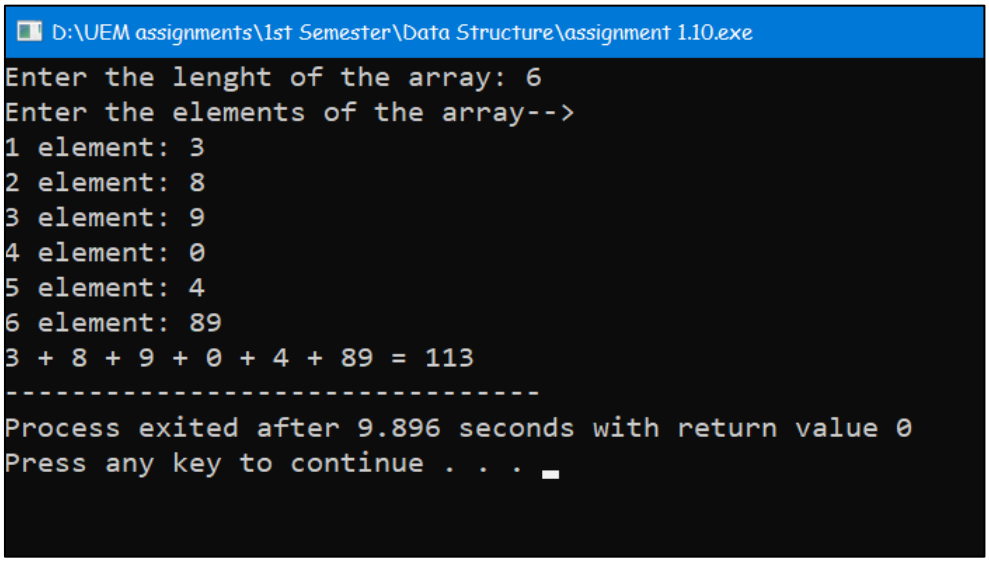
Problem No: 10

Problem Statement: Write a C program to check the sum of all elements of an array.

Source Code:

```
#include<stdio.h>
int main() {
	int len, i, sum = 0;
	printf("Enter the lenght of the array: ");
	scanf("%d", &len);
	int arr[len];
	printf("Enter the elements of the array-->\n");
	for (i = 0; i < len; i++) {
		printf("%d element: ", i + 1);
	scanf("%d", &arr[i]);
	}
	for (i = 0; i < len; i++) {
		sum += arr[i];
		printf("%d + ", arr[i]);
	}
	printf("\b\b= %d", sum);
	return 0;
}
```

Output:



Problem No: 11

Problem Statement: Write a C program to check duplicate number in an array.

Source Code:

```
#include <stdio.h>
int main() {
	int len, i, j, count = 0;
	printf("Enter the lenght of the array: ");
	scanf("%d", &len);
	int arr[len];
	printf("Enter the elements of the array-->\n");
	for (i = 0; i < len; i++) {
		printf("%d element: ", i + 1);
		scanf("%d", &arr[i]);
	}
	for (i = 0; i < len; i++)
		for (j = i + 1; j < len; j++)
		if (arr[i] == arr[j]) {
			count++;
			break;
			}
	if (count == 0)
		printf("No duplicates found in the array.\n");
	else
		printf("Number of duplicates found in the array = %d\n",
count);
    return 0;
}
```

Output: