Bahria University,

Karachi Campus



COURSE: CSC-221 DATA STRUCTURES AND ALGORITHM

TERM: FALL 2020, CLASS: BSE- 3 (A)

Submitted By:

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Submitted To:

Engr. Dr. Farah/ Engr. Ramshaa

Signed Remarks: Score:

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LAB EXPERIMENT NO.

\_\_\_01\_\_\_\_

LIST OF TASKS

|  |  |
| --- | --- |
| TASK NO | OBJECTIVE |
| Q | Create an array of length 10 of integers. Values ranging from 1 to 50. |
| 1 | Find all pair of elements whose sum is 25. |
| 2 | Find the number of elements of A which are even, and the number of elements of A which are odd. |
| 3 | Write a procedure which finds the average of the value of A. |
| 4 | Write a procedure which adds an element in an array at a given index. Take the value to add and the index from the user by using Shift down technique |
| 5 | Write a procedure which looks for 2 numbers 45 and 14 in an array and delete them if they are present in the array by using Shift up technique. |
| 6 | Write a program which input 2 matrix of user defined rows and columns and perform following operation  a. Display/Print as a Matrix  b. Addition of Matrix  c. Subtraction of Matrix  d. matrix multiplication  e. Determinant  f. Inverse |
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Submitted On:

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(Date: 09/10/20)

**Task No. :** Create an array of length 10 of integers. Values ranging from 1 to 50.

**Solution:**

int[] array = new int[10];

for (int i = 0; i < array.Length; i++)

{

array[i] = i \* 5;

}

for (int i = 0; i < array.Length; i++)

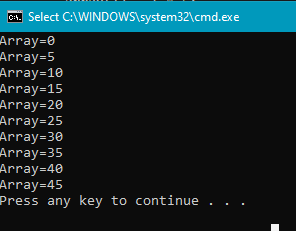
{

//array[0] = 1;

Console.WriteLine("Array={0}", array[i]);

}

**Output:**

****

**Task No. 1:** Find all pair of elements whose sum is 25.

**Solution:**

static void pairs\_value(int[] inputArray, int inputNumber)

{

Console.WriteLine("Pairs of elements and their sum : ");

for (int i = 0; i < inputArray.Length; i++)

{

for (int j = i + 1; j < inputArray.Length; j++)

{

if (inputArray[i] + inputArray[j] == inputNumber)

{

Console.WriteLine(inputArray[i] + " + " + inputArray[j] + " = " + inputNumber);

}

}

}

}

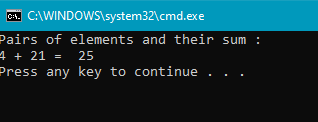
static void Main(string[] args)

{

pairs\_value(new int[] { 2, 7, 4, -5, 21 }, 25);

}

**Output:**

****

**Task No. 2:** Find the number of elements of A which are even, and the number of elements of A which are odd.

**Solution:**

Console.WriteLine("Enter a number of array we used");

int n = Convert.ToInt32(Console.ReadLine());

int[] A = new int[n] ;

for (int i = 0; i < A.Length; i++)

{

Console.WriteLine("Enter a Number of Array[{0}]", i);

A[i] = Convert.ToInt32(Console.ReadLine());

}

Console.WriteLine("ODD VALUES");

for (int i = 0; i < A.Length; i++)

{

if (A[i] % 2 == 0)

{

Console.Write("{0} , ", A[i]);

}

}

Console.WriteLine();

Console.WriteLine("EVEN VALUES");

for (int i = 0; i < A.Length; i++)

{

if (A[i]%2!=0)

{

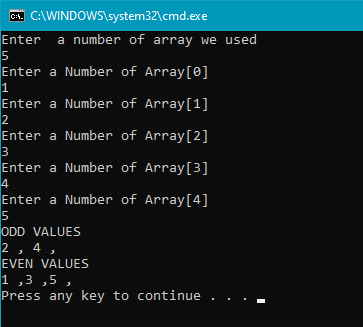
Console.Write("{0} ,",A[i]);

}

}

Console.WriteLine();

**Output:**

****

**Task No. 3:** Write a procedure which finds the average of the value of A.

**Solution:**

Console.WriteLine("Enter a number of array we used");

int n = Convert.ToInt32(Console.ReadLine());

int[] A = new int[n];

int sum=0;

int average;

for (int i = 0; i < A.Length; i++)

{

Console.WriteLine("Enter Number A[{0}]",i);

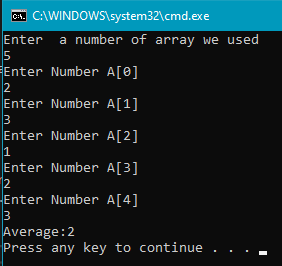
A[i] = Convert.ToInt32(Console.ReadLine());

sum += A[i];

}

average = sum / n;

Console.WriteLine("Average:{0}",average);

**Output: **

**Task No. 4:** Write a procedure which adds an element in an array at a given index. Take the value to add and the index from the user by using Shift down technique.

**Solution:**

int i, n, x, p;

int[] arr1 = new int[10];

arr1[0] = 1;

arr1[1] = 2;

arr1[2] = 3;

arr1[3] = 4;

n = 4;

Console.Write("Input the value to be inserted : ");

x = Convert.ToInt32(Console.ReadLine());

Console.Write("Input the Position, where the value to be inserted :");

p = Convert.ToInt32(Console.ReadLine());

Console.Write("The current list of the array :\n");

for ( i = 0; i <n; i++)

{

Console.WriteLine("{0}", arr1[i]);

}

/\* Move all data at right side of the array \*/

for ( i = n; i >= p; i--)

{

arr1[i] = arr1[i - 1];

arr1[p - 1] = x;

}

/////\* insert value at given position \*/

Console.Write("\n\nAfter Insert the element the new list is :\n");

for ( i = 0; i <= n; i++)

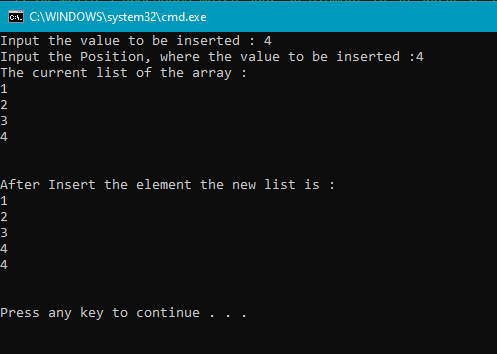
{

Console.WriteLine("{0}",arr1[i]);

}

Console.Write("\n\n");

**Output:**

****

**Task No. 5:** Write a procedure which looks for 2 numbers 45 and 14 in an array and delete them if they are present in the array by using Shift up technique.

**Solution:**

int n1 = 45, n2 = 14;

int[] arr1 = new int[10];

Console.WriteLine("Enter the value between 1 to 50");

for (int i = 0; i < arr1.Length; i++)

{

Console.Write("Element[{0}]=",i);

arr1[i] = Convert.ToInt32(Console.ReadLine());

}

Console.Write("The Uptadet list of the array :\n");

for (int i = 0; i < arr1.Length; i++)

{

if ((arr1[i] == n1) || (arr1[i] == n2))

{

arr1 = arr1.Except(new int[] { 14 }).ToArray();

arr1 = arr1.Except(new int[] { 45 }).ToArray();

}

}

for (int i = 0; i <arr1.Length; i++)

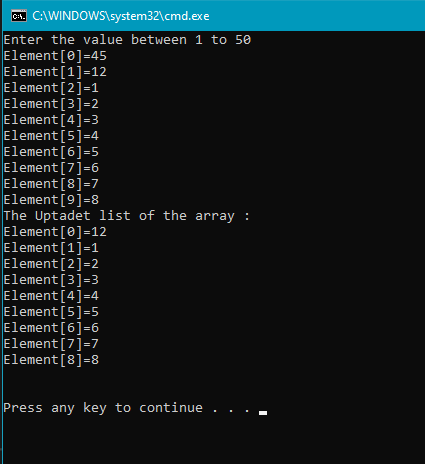
{

Console.WriteLine("Element[{0}]={1}", i, arr1[i]);

}

Console.Write("\n\n");

**Output:**

****

**2D ARRAYS**

**Task No. 5:** Write a program which input 2 matrix of user defined rows and columns and perform following operation

a. Display/Print as a Matrix

b. Addition of Matrix

c. Subtraction of Matrix

d. matrix multiplication

e. Determinant

f. Inverse

**Solution:**

**int n;**

**char o;**

**do**

**{**

**Console.WriteLine("Which you want to perform an operation ");**

**Console.WriteLine(" 1) Display / Print as a Matrix\n 2) Addition of Matrix \n 3) Subtraction of Matrix \n 4) matrix multiplication\n 5)Determinant\n 6)Inverse");**

**n = Convert.ToInt32(Console.ReadLine());**

**if (n == 1)**

**{**

**Console.WriteLine("===DISPLAY MATRIXS===");**

**Console.WriteLine("enter the matric row and colomn");**

**Console.WriteLine("enter the rows");**

**int row = Convert.ToInt32(Console.ReadLine());**

**Console.WriteLine("enter the colomn");**

**int col = Convert.ToInt32(Console.ReadLine());**

**int[,] matric1 = new int[row, col];**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric1[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.Write(" " + matric1[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric2 = new int[row, col];**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric2[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.Write(" " + matric2[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**}**

**else if (n == 2)**

**{**

**Console.WriteLine("=====ADDITION OF MATRIX======");**

**Console.WriteLine("enter the matric row and colomn");**

**Console.WriteLine("enter the rows");**

**int row = Convert.ToInt32(Console.ReadLine());**

**Console.WriteLine("enter the colomn");**

**int col = Convert.ToInt32(Console.ReadLine());**

**int[,] matric1 = new int[row, col];**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric1[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.Write(" " + matric1[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric2 = new int[row, col];**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric2[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.Write(" " + matric2[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric3 = new int[row, col];**

**for (int i = 0; i < row; i++)**

**{**

**for (int j = 0; j < col; j++)**

**{**

**matric3[i, j] = matric1[i, j] + matric2[i, j];**

**}**

**}**

**Console.WriteLine("RESULT OF ADDITION MATRICES");**

**for (int i = 0; i < row; i++)**

**{**

**for (int j = 0; j < col; j++)**

**{**

**Console.Write(" " + matric3[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**}**

**else if (n == 3)**

**{**

**Console.WriteLine("=====SUBTRACTION OF MATRIX======");**

**Console.WriteLine("enter the matric row and colomn");**

**Console.WriteLine("enter the rows");**

**int row = Convert.ToInt32(Console.ReadLine());**

**Console.WriteLine("enter the colomn");**

**int col = Convert.ToInt32(Console.ReadLine());**

**int[,] matric1 = new int[row, col];**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric1[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.Write(" " + matric1[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric2 = new int[row, col];**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric2[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.Write(" " + matric2[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric3 = new int[row, col];**

**for (int i = 0; i < row; i++)**

**{**

**for (int j = 0; j < col; j++)**

**{**

**matric3[i, j] = matric1[i, j] - matric2[i, j];**

**}**

**}**

**Console.WriteLine("RESULT OF SUBTRACTION MATRICES");**

**for (int i = 0; i < row; i++)**

**{**

**for (int j = 0; j < col; j++)**

**{**

**Console.Write(" " + matric3[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**}**

**else if (n == 4)**

**{**

**Console.WriteLine("==========MAULTIPLICATION MATRICES=========");**

**Console.WriteLine("enter the matric row and colomn");**

**Console.WriteLine("enter the rows");**

**int row = Convert.ToInt32(Console.ReadLine());**

**Console.WriteLine("enter the colomn");**

**int col = Convert.ToInt32(Console.ReadLine());**

**int[,] matric1 = new int[row, col];**

**int[,] matric3 = new int[row, col];**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric1[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.Write(" " + matric1[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric2 = new int[row, col];**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric2[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric2.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric2.GetLength(1); j++)**

**{**

**Console.Write(" " + matric2[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**for (int i = 0; i < row; i++)**

**{**

**for (int j = 0; j < col; j++)**

**{**

**matric3[i, j] = 0;**

**for (int k = 0; k < 2; k++)**

**{**

**matric3[i, j] += matric1[i, k] \* matric2[k, j];**

**}**

**}**

**}**

**Console.WriteLine("RESULT OF MATRIX MULTIPLCATION");**

**for (int i = 0; i < row; i++)**

**{**

**for (int j = 0; j < col; j++)**

**{**

**Console.Write(" " + matric3[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**}**

**else if (n==5)**

**{**

**Console.WriteLine("=====DETERMINENT OF MATRIX======");**

**Console.WriteLine("enter the matric row and colomn");**

**int[,] matric1 = new int[2, 2];**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.WriteLine("enter the values of matrix {0},{1}", i, j);**

**matric1[i, j] = Convert.ToInt32(Console.ReadLine());**

**}**

**}**

**for (int i = 0; i < matric1.GetLength(0); i++)**

**{**

**for (int j = 0; j < matric1.GetLength(1); j++)**

**{**

**Console.Write(" " + matric1[i, j] + " ");**

**}**

**Console.WriteLine();**

**}**

**int[,] matric3 = new int[2, 2];**

**int ans=0;**

**for (int i = 0; i < 2; i++)**

**{**

**for (int j = 0; j < 2; j++)**

**{**

**ans = matric1[0, 0] \* matric1[1, 1] - matric1[0, 1] \* matric1[1, 0];**

**}**

**}**

**Console.WriteLine("RESULT OF DETERMINENT MATRICES");**

**Console.WriteLine("ANS=={0}",ans);**

**}**

**else if (n==6)**

**{**

//a inverse A/det.Ainverse

Console.WriteLine("=====INVERSE OF MATRIX======");

Console.WriteLine("enter the matric row and colomn");

double[,] matric1 = new double[2, 2];

for (int i = 0; i < matric1.GetLength(0); i++)

{

for (int j = 0; j < matric1.GetLength(1); j++)

{

Console.WriteLine("enter the values of matrix {0},{1}", i, j);

matric1[i, j] = Convert.ToDouble(Console.ReadLine());

}

}

for (int i = 0; i < matric1.GetLength(0); i++)

{

for (int j = 0; j < matric1.GetLength(1); j++)

{

Console.Write(" " + matric1[i, j] + " ");

}

Console.WriteLine();

}

Console.WriteLine("=========INVERSE OF MATRIC======");

double temp;

double[,] matric3 = new double[2, 2];

double ans = 0;

for (int i = 0; i < 2; i++)

{

for (int j = 0; j < 2; j++)

{

ans = matric1[0, 0] \* matric1[1, 1] - matric1[0, 1] \* matric1[1, 0];

}

}

for (int i = 0; i < 2; i++)

{

for (int j = 0; j < 2; j++)

{

temp = matric1[0, 0];

matric1[0, 0] = matric1[1, 1];

matric1[1, 1] = temp;

matric1[1, 0] = (-1) \* (matric1[1, 0]);

Console.Write(" " + matric1[i, j] + " ");

matric1[0, 1] = (-1) \* (matric1[0, 1]);

temp = matric1[0, 0];

matric1[0, 0] = matric1[1, 1];

matric1[1, 1] = temp;

}

Console.WriteLine();

}

try

{

for (int i = 0; i < 2; i++)

{

for (int j = 0; j < 2; j++)

{

if (i==0&&j == 0)

{

matric3[0, 0] = matric1[0, 0] / ans;

// Console.WriteLine("[{0},{1}]=", i, j);

}

else if (i == 1 && j == 0)

{

matric3[1, 0] = matric1[1, 0] / ans;

// Console.WriteLine("[{0},{1}]=", i, j);

}

else if (i==0&&j == 1)

{

matric3[0, 1] = matric1[0, 1] / ans;

// Console.WriteLine("[{0},{1}]=", i, j);

}

else if (i == 1 && j == 1)

{

matric3[1, 1] = matric1[1, 1] / ans;

// Console.WriteLine("[{0},{1}]=", i, j);

}

}

}

}

catch (Exception e)

{

Console.WriteLine(e.Message);

}

Console.WriteLine("RESULT OF DETERMINENT MATRICES");

Console.WriteLine("Determinent=={0}", ans);

Console.WriteLine("Inverse");

for (int i = 0; i < 2; i++)

{

for (int j = 0; j < 2; j++)

{

temp = matric3[0, 0];

matric3[0, 0] = matric3[1, 1];

matric3[1, 1] = temp;

matric3[1, 0] = (-1) \* (matric3[1, 0]);

Console.Write(" " + matric3[i, j] + " ");

matric3[0, 1] = (-1) \* (matric3[0, 1]);

temp = matric3[0, 0];

matric3[0, 0] = matric3[1, 1];

matric3[1, 1] = temp;

}

Console.WriteLine();

}

**}**

**else**

**{**

**Console.WriteLine("PLEASE ENTER NUMBER BETWEEN 1 TO 6 !!!! INVALID NUMBER!!!!!!!!!!!!");**

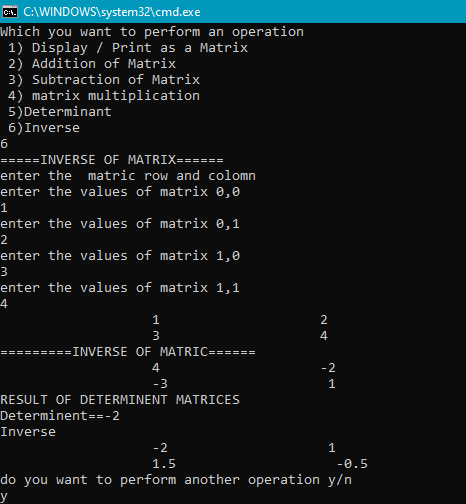
**}**

**Console.WriteLine("do you want to perform another operation y/n");**

**o = Convert.ToChar(Console.ReadLine());**

**} while (o =='y'||o=='Y');**

**Output:**

****

