//1

#include<stdio.h>//This header file consists of input and output related functions printf and scanf

int main ()

{

int i,j,m,n,a[100][100],sum;//row column declaration and matrix declaration

printf("Enter the number of rows and columns : ");

scanf("%d %d",&i,&j);//row and column initialization

printf("Enter matrix rows and column elements :\n");

//matrix initialization

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

{

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

{

scanf("%d",&a[m][n]);// to get input of the matrix from user

}

}

for(m=0;m<i;m++)//here rows are varying whereas columns stay constant

{

sum=0;

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

{

sum=sum+a[n][m]; // for addition of columns

}

printf("The sum of column elements of the matrix= %d\n",sum); //to print the sum of columns as output

}

return 0; //The function doesn't return any value and it is terminated

}

/\*Application :

Used for study of electrical circuits, quantum mechanics and optics , calculation of battery power outputs, resistor conversion of electrical energy into another useful energy. \*/

//2

#include <stdio.h>

int main() {

int matrix[4][4];//matrix declaration//

int i,j,k=0;//rows and columns declarations//

int blackbox = 4\*4; //m\*n of matrix

int whitebox = 0;//refers to unique elements present in the matrix//

int arrstore[4\*4];// to save time but it cover some spaces//

//Matrix input

for(i =0; i<4; i++)

{

for(j=0; j<4; j++)

{

scanf("%d",&matrix[i][j]);//to get the matrix elements//

arrstore[k++] = matrix[i][j];

}

}

for(i=0; i<4; i++)

{

for(j=0; j<4; j++)

{

if(isUnique(arrstore,matrix[i][j], 4\*4) == 1)//it checks whether the element is unique or not//

{

whitebox++;

}

}

}

blackbox = blackbox-whitebox;//since we get all elements in the whitebox so we subtract it with blackbox to find no of blackbox//

printf("Black box : %d\n",blackbox);// to display the number of same elements present in the matrix//

printf("White box : %d\n", whitebox);// to display the number of unique elements present in the matrix//

return 0;

}

int isUnique(int arr[], int key, int size)//function declaration//

{

int i,cnt=0;

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

{

if(arr[i] == key)//to check whether the elements are same or not//

{

cnt++;

}

}

if(cnt == 1)

{

return 1;// it returns the above for loop//

}

return -1;// it is a false statement so it run the program from the start//

}

Application :

Used to examine the functionality of application and mostly used for software testing

To analyse data structures and internal design