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A-28

LAB Assignment 9

1. Write a C Program to find out the sum of the elements stored in a matrix of dimension M X N (user inputs, M ≠ N).

Program:-

```
#include <stdio.h>
int main(){
    int i , j, k ,m , n, sum =0;
    printf("\n\nEnter the dimension of matrix (Note: Rows != columns) :");
    scanf("%d,%d",&m ,&n);
    if (m!=n){
        int arr[m][n];
        printf("Enter the elements of matrix :\n");
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                scanf("%d",&arr[i][j]);
            }
        }
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                sum += arr[i][j];
            }
        }
        printf("The sum of the elements stored in the array is : %d\n\n",
sum);
    }
  else{
    printf("matrix dimensions are same, Try other value!!!!! \n\n");
  }
    return 0;
}
```

Output:-

```
Enter the dimension of matrix (Note: Rows != columns) :2,3
Enter the elements of matrix :
1 2 3
4 5 6
The sum of the elements stored in the array is : 21

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```

2. Write a C Program to find out the transpose of a given matrix of dimension M X N (user inputs, M ≠ N).

Program:-

```
#include <stdio.h>

int main(){
    int i , j, k ,m , n;
    printf("\n\nEnter the dimension of matrix (Note: Rows != columns) :");
    scanf("%d,%d",&m ,&n);
    if (m!=n){
        int arr1[m][n];
        int arr2[n][m];
        printf("Enter the elements of matrix :\n");
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                scanf("%d",&arr1[i][j]);
            }
          printf("\n");
        }
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                arr2[j][i]=arr1[i][j];
            }
        }
      printf("Transpose of the given matrix is :\n");
      for (i=0 ; i<n ; i++){
            for (j=0 ; j<m ; j++){
            printf("%d\t",arr2[i][j]);
              }
        printf("\n");
        }
        printf("\n\n");
    }
  else{
    printf("matrix dimensions are same, Try other value!!!!! \n\n");
  }
    return 0;
}
```

Output:

```
Enter the dimension of matrix (Note: Rows != columns) :3,2
Enter the elements of matrix :
1 2

3 4

5 6

Transpose of the given matrix is :
1       3       5
2       4       6


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cc LA9_2_transpose.c -o LA9_2_transpose } ; if ($?) { .\LA9_2_transpo


Enter the dimension of matrix (Note: Rows != columns) :4,3
Enter the elements of matrix :
1 2 3

4 5 6

7 8 9

11 12 13

Transpose of the given matrix is :
1       4       7       11
2       5       8       12
3       6       9       13
```

3. Write a C Program to find out the sum of the diagonal elements of a square matrix of order N (user input).

Program:-

```
#include <stdio.h>

int main(){
    int i , j, k ,m ,sum =0;
    printf("\n\nEnter the dimension n of square matrix (Note: Rows =
columns) :");
    scanf("%d",&m);
        int arr[m][m];
        printf("Enter the elements of matrix :\n");
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<m ; j++){
                scanf("%d",&arr[i][j]);
            }
          printf("\n");
        }
      for (i=0 ; i<m ; i++){
              sum += arr[i][i];
            }
      printf("Sum of the diagonal elements of the given square matrix is :
%d\n\n",sum);
    return 0;
}
```

Output:-

```
Enter the dimension n of square matrix (Note: Rows = columns) :3
Enter the elements of matrix :
55 66 99

22 88 44

11 77 33

Sum of the diagonal elements of the given square matrix is : 176

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```

4. Write a C Program to check whether a given matrix is a symmetric matrix or not. [Note: In linear algebra, a symmetric matrix is a square matrix that is equal to its transpose.]

Program:-

```
#include <stdio.h>

int main(){
    int i , j, k ,m , n , flag =0;
    printf("\n\nEnter the dimension of matrix  :");
    scanf("%d,%d",&m ,&n);
    if (m==n){
        int arr[m][n];
        printf("Enter the elements of matrix :\n");
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                scanf("%d",&arr[i][j]);
            }
          printf("\n");
        }
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                if ((arr[j][i]) == (arr[i][j])){
                  flag+=1;
                }
            }
        }
        if (flag == (m*n)){
            printf("The given matrix is symmetric.\n\n");
        }
        else{
          printf("The given matrix is not symmetric.\n\n");
        }
        }
  else{
    printf("matrix dimensions are not same, it is not symmetric.\n\n ");
  }
    return 0;
}
```

Output:-

```
Enter the dimension of matrix  :3,4
matrix dimensions are not same, it is not symmetric.


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cc tempCodeRunnerFile.c -o tempCodeRunnerFile } ; if ($?) { .\


Enter the dimension of matrix  :3,3
Enter the elements of matrix :
1 2 3

4 5 6

7 8 9

The given matrix is not symmetric.

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cc tempCodeRunnerFile.c -o tempCodeRunnerFile } ; if ($?) { .\


Enter the dimension of matrix  :3,3
Enter the elements of matrix :
1 2 3

2 1 2

3 2 3

The given matrix is symmetric.

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```

5. Write a C Program to check whether a given matrix is an orthogonal matrix or not. [Note: In linear algebra, an orthogonal matrix, or orthonormal matrix, is a real square matrix whose product with its transpose matrix is an identity matrix.]

Program:-

```
#include <stdio.h>

int main(){
    int i , j, k ,m , n ,sum ,flag =0;
    printf("\n\nEnter the dimension of matrix (Note: Rows = columns) :");
    scanf("%d,%d",&m ,&n);
    if (m==n){
        int arr1[m][n];
        int arrT[n][m];
        int arrM[n][m] ;
        printf("Enter the elements of matrix :\n");
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                scanf("%d",&arr1[i][j]);
            }
          printf("\n");
        }
        for (i=0 ; i<m ; i++){
            for (j=0 ; j<n ; j++){
                arrT[j][i]=arr1[i][j];
            }
        }
        for  (i=0 ; i<m ; i++){
          for (k=0 ; k<n ; k++){
            arrM[i][k] =0;
            for (j=0 ; j<n ; j++){
                arrM[i][k] += (arr1[i][j])*(arrT[j][k]);
            }
            if ((arrM[i][k]==0)||(arrM[i][i]==1)){
                  flag += 0;
            }
            else{
                flag +=1;
            }
          }
```

```
        }
        if (flag==0){
        printf("The given matrix is orth0gonal.:\n");
        }
        else{
          printf("The given matrix is not orthogonal.:\n");
        }
      }
    else{
    printf("matrix dimensions are not the same, Try similar values!!!!!
");
  }
    return 0;
}
```

Output:-

```
Enter the dimension of matrix (Note: Rows = columns) :3,3
Enter the elements of matrix :
1 2 3

4 5 6

7 8 9

The given matrix is not orthogonal.:
PS C:\Users\Prasanna Dhungana\OneDrive\Desktop\2nd sem\21053439_A28\
cc LA9_5_TransposeIdentity.c -o LA9_5_TransposeIdentity } ; if ($?)


Enter the dimension of matrix (Note: Rows = columns) :3,3
Enter the elements of matrix :
1 0 0

0 -1 0

0 0 1

The given matrix is orth0gonal.:
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```