

## Assignment 16

### Multi-Dimensional Array in C Language

- ① write a program to calculate the sum of two matrices each of order  $3 \times 3$ .

```
#include <stdio.h>
void input1 (int [][n], int);
void input2 (int [][n], int);
void input3 (int [][n], int [][n], int [][n], int);
int n=3;
int main()
{
    int a[n][n], b[n][n], c[n][n];
    input1 (a, n);
    input2 (b, n);
    output (a, b, c, n);
    return 0;
}

void input1 (int a[][n], int n)
{
    int i, j;
    printf ("enter 9 number for 1'st matrix - \n");
    for (i=0; i<n; i++)
    {
        for (j=0; j<n; j++)
        {
            scanf ("%d", &a[i][j]);
        }
    }
}

void output (int a[][n], int b[][n], int c[][n], int n)
{
    int i, j;
    printf ("Sum of two matrices is = \n");
    for (i=0; i<n; i++)
    {
        for (j=0; j<n; j++)
        {
            c[i][j] = a[i][j] + b[i][j];
            printf ("%5d", c[i][j]);
        }
        printf ("\n");
    }
}
```

- ② write a program to calculate the product of two matrices each of order  $3 \times 3$ .

```
#include <stdio.h>
int n=3;
void input1 (int [][n], int);
void input2 (int [][n], int);
void input3 (int [][n], int [][n], int [][n], int);
int main()
{
    int a[n][n], b[n][n], c[n][n];
    input1 (a, n);
    input2 (b, n);
    input3 (a, b, c, n);
    return 0;
}
```

void input 1 (int a[][n], int n)

```
{
    int i, j;
    printf("Enter 9 number for 1st matrix - \n");
    for (i=0; i<n; i++)
    {
        for (j=0; j<n; j++)
        {
            scanf("%d", &a[i][j]);
        }
    }
}
```

void input 2 (int b[][n], int n)

```
{
    int i, j;
    printf("Enter 9 numbers for 2nd matrix - \n");
    for (i=0; i<n; i++)
    {
        for (j=0; j<n; j++)
        {
            scanf("%d", &b[i][j]);
        }
    }
}
```

void output (int a[][n], int b[][n], int c[][n], int c)

```
{
    int i, j, sum;
    printf("Product of two matrices is = \n");
    for (i=0; i<n; i++)
    {
        for (j=0; j<n; j++)
        {
            sum=0;
            c[i][j]=sum;
            printf("%d", c[i][j]);
        }
        printf("\n");
    }
}
```

③ write a program in C to find the transpose of a given matrix.

```
#include<stdio.h>
```

```
int main()
```

```
{
    int i, j, a, b;
```

```
    printf("Enter the number of row and column - \n");
```

```
    scanf("%d %d", &a, &b);
```

```
    int arr[a][b], transpose[b][a];
```

```
    for (i=0; i<a; i++)
```

```
    {
        printf("Enter %d elements for %d row - \n", b, i+1);
```

```
        for (j=0; j<b; j++)
```

```
        {
            scanf("%d", &arr[i][j]);
```

```
        }
```

```
    }
    printf("matrix is = \n");
```

```

for (i = 0; i < a; i++)
{
    for (j = 0; j < b; j++)
    {
        printf("%3d", arr[i][j]);
    }
    printf("\n");
}

for (i = 0; i < a; i++)
{
    for (j = 0; j < b; j++)
    {
        transpose[j][i] = arr[i][j];
    }
}

printf("After Transpose this matrix is = \n");
for (i = 0; i < b; i++)
{
    for (j = 0; j < a; j++)
    {
        printf("%4d", transpose[i][j]);
    }
    printf("\n");
}

return 0;
}

```

④ write a program in C to find the sum of right diagonals of matrix.

```

#include <stdio.h>
int main()
{
    int a, b, i, j;
    printf("\nEnter a square matrix \n");
    printf("Number of Rows = ");
    scanf("%d", &a);
    printf("Number of column = ");
    scanf("%d", &b);
    if (a == b)
    {
        int arr[a][b];
        for (i = 0; i < a; i++)
        {
            printf("Enter %d Number for %d Row \n", b, i+1);
            for (j = 0; j < b; j++)
            {
                scanf("%d", &arr[i][j]);
            }
        }
        printf("matrix is = \n");
        for (i = 0; i < a; i++)
        {
            for (j = 0; j < b; j++)
            {
                printf("%4d", arr[i][j]);
            }
            printf("\n");
        }
    }
}

```

```

int sum = 0;
printf("Sum of Right Diagonals is = ");
for (i = 0; i < a; i++)
{
    for (j = 0; j < b; j++)
    {
        if (j == a - i - 1)
        {
            sum = sum + arr[i][j];
        }
    }
}
printf("%d", sum);
}
else
{
    printf("Not possible of it's diagonals sum");
}
return 0;
}

```

⑤ write a program in C to find the sum of left diagonals of a matrix.

```

#include <stdio.h>
int main()
{
    int a, b, i, j;
    printf("\nEnter a square matrix\n");
    printf("Number of Row = ");
    scanf("%d", &a);
    printf("Number of Column = ");
    scanf("%d", &b);
    if (a == b)
    {
        int arr[a][b];
        for (i = 0; i < a; i++)
        {
            printf("Enter %d Number for %d Row\n", b, i+1);
            for (j = 0; j < b; j++)
            {
                scanf("%d", &arr[i][j]);
            }
        }
        printf("matrix is = \n");
        for (i = 0; i < a; i++)
        {
            for (j = 0; j < b; j++)
            {
                printf("%d ", arr[i][j]);
            }
            printf("\n");
        }
        int sum = 0;
        printf("Sum of Left diagonals is = ");
        for (i = 0; i < a; i++)
        {
            for (j = 0; j < b; j++)
            {
                if (j == i)

```

```

    {
        sum = sum + arr[i][j];
    }
}
printf("%d", sum);
}
else
{
    printf("Not possible of its diagonal sum");
}
return 0;
}

```

⑥ write a program in C to find the sum of rows and columns of a matrix.

```

#include <stdio.h>
int main()
{
    int a, b, i, j;
    printf("Enter a square matrix \n");
    printf("Number of Rows = ");
    scanf("%d", &a);
    printf("Number of Column = ");
    scanf("%d", &b);
    if(a == b)
    {
        int arr[a][b];
        for(i = 0; i < a; i++)
        {
            printf("Enter %d number for Row No : %d - \n", b, i+1);
            for(j = 0; j < b; j++)
            {
                scanf("%d", &arr[i][j]);
            }
        }
        printf("matrix is = \n");
        printf("*****\n");
        for(i = 0; i < a; i++)
        {
            for(j = 0; j < b; j++)
            {
                printf("%4d", arr[i][j]);
            }
            printf("\n");
        }
        printf("*****\n");
        int sum;
        for(i = 0; i < a; i++)
        {
            sum = 0;
            for(j = 0; j < b; j++)
            {
                sum = sum + arr[i][j];
            }
            printf("Sum of Row No: %d = %d\n", i+1, sum);
        }
    }
}

```

```

printf("*****\n");
int s;
for (i=0; i<a; i++)
{
    s=0;
    for (j=0; j<b; j++)
    {
        s=s+arr[i][j];
    }
    printf("Sum of Column No: %d == %d\n", i+1, s);
}
}
else
{
    printf("Please enter a square matrix");
}
return 0;
}

```

⑦ write a program in c to print or display the lower triangular of given matrix

```

#include<stdio.h>
int main()
{
    int a, b, i, j;
    printf("Enter a square matrix\n");
    printf("Number of Rows = ");
    scanf("%d", &a);
    printf("Number of Column = ");
    scanf("%d", &b);
    int arr[a][b];
    if(a==b)
    {
        for (i=0; i<a; i++)
        {
            printf("Enter %d numbers for Row No: %d -\n", b, i+1);
            for (j=0; j<b; j++)
            {
                scanf("%d", &arr[i][j]);
            }
        }
        printf("matrix is =\n");
        printf("*****\n");
        for (i=0; i<a; i++)
        {
            for (j=0; j<b; j++)
            {
                printf("%4d", arr[i][j]);
            }
            printf("\n");
        }
        printf("*****\n");
        printf("Lower Triangular matrix is -\n");
        for (i=0; i<a; i++)
        {
            int x=0;
            for (j=0; j<b; j++)

```



```

{
    if (j > i)
    {
        printf("%3d", x);
    }
    else
        printf("%3d", arr[i][j]);
}
printf("\n");
}
else
    printf("Please enter a square matrix (Eg - 2*2, 3*3, 4*4)");
return 0;
}

```

⑧ write a program in C to print or display an upper triangular matrix.

```

#include <stdio.h>
int main()
{
    int a, b, i, j;
    printf("Enter a square matrix \n");
    printf("Numbers of Rows = ");
    scanf("%d", &a);
    printf("Number of Column = ");
    scanf("%d", &b);
    int arr[a][b];
    if (a == b)
    {
        for (i = 0; i < a; i++)
        {
            printf("Enter %d Number for Row No: %d - \n", b, i+1);
            for (j = 0; j < b; j++)
            {
                scanf("%d", &arr[i][j]);
            }
        }
        printf("matrix is = \n");
        printf("***** \n");
        for (i = 0; i < a; i++)
        {
            for (j = 0; j < b; j++)
            {
                printf("%4d", arr[i][j]);
            }
            printf("\n");
        }
        printf("***** \n");
        printf("Upper Triangular matrix is - \n");
        for (i = 0; i < a; i++)
        {
            int x = 0;
            for (j = 0; j < b; j++)
            {
                if (j < i)

```

```

    }
    printf("\n");
}
else
    printf("please enter a square matrix (Eg: 2*2, 3*3)");
return 0;
}

```

- ⑤ write a program in C to accept a matrix and determine whether it is a sparse matrix.

```

#include <stdio.h>
int main()
{
    int a, b, i, j;
    printf("Enter a matrix \n");
    printf("Number of Rows = ");
    scanf("%d", &a);
    printf("Number of column = ");
    scanf("%d", &b);
    int arr[a][b];
    for (i = 0; i < a; i++)
    {
        printf("Enter %d number for Row No : %d - \n", b, i+1);
        for (j = 0; j < b; j++)
        {
            scanf("%d", &arr[i][j]);
        }
    }
    printf("matrix is = \n");
    printf("*****\n");
    for (i = 0; i < a; i++)
    {
        for (j = 0; j < b; j++)
        {
            printf("%4d", arr[i][j]);
        }
        printf("\n");
    }
    printf("*****\n");
    int x = 0;
    for (i = 0; i < a; i++)
    {
        for (j = 0; j < b; j++)
        {
            if (arr[i][j] == 0)
            {
                x++;
            }
        }
    }
    if (x > (a * b) / 2)
        printf("sparse matrix \n");
    else
        printf("Not a sparse matrix \n");
    return 0;
}

```



Write a program in C to find the row with maximum number of 1s.

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
int main()
```

```
{  
    int a, b, i, j;
```

```
    printf("Enter no. of row and column \n");
```

```
    printf("Enter number in binary form \n");
```

```
    printf("Number of Rows = ");
```

```
    scanf("%d", &a);
```

```
    printf("Number of column = ");
```

```
    scanf("%d", &b);
```

```
    int arr[a][b];
```

```
    for (i = 0; i < a; i++)
```

```
    {  
        printf("Enter %d Number for Row No: %d - \n", b, i+1);
```

```
        for (j = 0; j < b; j++)
```

```
        {  
            scanf("%d", &arr[i][j]);
```

```
        }
```

```
    }  
    printf("***** \n");
```

```
    printf("matrix is = \n");
```

```
    for (i = 0; i < a; i++)
```

```
    {  
        for (j = 0; j < b; j++)
```

```
        {  
            printf("%4d", arr[i][j]);
```

```
        }
```

```
        printf("\n");
```

```
    }
```

```
    printf("***** \n");
```

```
    int y = 0, z;
```

```
    for (i = 0; i < a; i++)
```

```
    {  
        int x = 0;
```

```
        for (j = 0; j < b; j++)
```

```
        {  
            if (arr[i][j] == 1)
```

```
            {  
                x++;
```

```
            }
```

```
        }  
        if (x > y)
```

```
        {  
            y = 0;
```

```
            z = 0;
```

```
            z = x;
```

```
            z = i+1;
```

```
        }
```

```
    }
```

```
    printf("The index of row with maximum 1s is: %d", z);
```

```
    return 0;
```