----------Questions on Matrix----------

1

```
#include <stdio.h>
#define M 3
#define N 3
void add_matrices(int matrix1[M][N], int matrix2[M][N], int result[M][N]) {
    for (int i = 0; i < M; i++) {
        for (int j = 0; j < N; j++) {
            result[i][j] = matrix1[i][j] + matrix2[i][j];
        }
    }
}

void print_matrix(int matrix[M][N]) {
    for (int i = 0; i < M; i++) {
        for (int j = 0; j < N; j++) {
            printf("%d ", matrix[i][j]);
        }
        printf("\n");
    }
}

int main() {
    int matrix1[M][N], matrix2[M][N];
    int result[M][N];
    printf("Enter elements of the first matrix (3x3):\n");
    for (int i = 0; i < M; i++) {
```

```
        for (int j = 0; j < N; j++) {
            printf("matrix1[%d][%d]: ", i, j);
            scanf("%d", &matrix1[i][j]);
        }
    }
    printf("Enter elements of the second matrix (3x3):\n");
    for (int i = 0; i < M; i++) {
        for (int j = 0; j < N; j++) {
            printf("matrix2[%d][%d]: ", i, j);
            scanf("%d", &matrix2[i][j]);
        }
    }
    if (M != M || N != N) {
        printf("Matrix dimensions do not match. Cannot perform addition.\n");
        return 1;
    }
    add_matrices(matrix1, matrix2, result);
    printf("Resulting matrix after addition:\n");
    print_matrix(result);

    return 0;
}
```

2

```
#include<stdio.h>
#define m 3
#define n 3
void transporse(int matrix[m][n],int result[m][n]){
    for(int i=0;i<m;i++){
```

```
        for(int j=0;j<n;j++){
            result[j][i]=matrix[i][j];
        }
    }
}

void print_matrix(int matrix[m][n]){
    for(int i=0;i<m;i++){
        for(int j=0;j<n;j++){
            printf("%d",matrix[i][j]);
        }
        printf("\n");
    }
}
int main(){
    int matrix[m][n],result[m][n];
    for(int i=0;i<m;i++){
        for(int j=0;j<n;j++){
            printf("matrix[%d][%d]",i,j);
            scanf("%d",&matrix[i][j]);
        }
    }
    printf("initial matrix is:");
    print_matrix(matrix);
    transporse(matrix,result);
    printf("the transporse matrix is:");
    print_matrix(result);
    return 0;
}
```

```
//3
#include<stdio.h>
#define m 3
#define n 3
void find_max(int matrix[m][n],int max_values[m]){
      for(int i=0;i<m;i++){
         int max=matrix[i][0];
         for(int j=0;j<n;j++){
            if(matrix[i][j]>max){
               max=matrix[i][j];
            }
         }
         max_values[i]=max;
      }
}
void print_max(int max_values[m]){
   for(int i=0;i<m;i++){
       printf("%d",max_values[i]);
   }
}

int main(){
   int matrix[m][n],max_values[m];
   printf("enter the value for matrix");
   for(int i=0;i<m;i++){
       for(int j=0;j<n;j++){
          printf("matrix[%d][%d]",i,j);
          scanf("%d",&matrix[i][j]);
```

```
        }
    }
    find_max(matrix,max_values);
    printf("the max values are :");
    print_max(max_values);
}
```

4

```
#include<stdio.h>
#define m 3
#define n 3
#define p 3

void multiply_matrices(int A[m][n],int B[m][n],int C[m][n]){
    for(int i=0;i<m;i++){
        for(int j=0;j<p;j++){
            C[i][j]=0;
            for(int k=0;k<n;k++){
                C[i][j]+=A[i][k]*B[k][j];
            }
        }
    }
}
void print_matrices(int matrix[m][n]){
    for(int i=0;i<m;i++){
        for(int j=0;j<n;j++){
            printf("%d\t",matrix[i][j]);
        }
        printf("\n");
```

```
    }

}

int main(){
    int A[m][n],B[m][n],C[m][n];
    printf("enter the matrix elements for matrix A\n");
    for(int i=0;i<m;i++){
        for(int j=0;j<n;j++){
            printf("enter the element for matrix[%d][%d] :",i,j);
            scanf("%d",&A[i][j]);
        }
    }
    printf("enter the matrix elements for matrix B\n");
    for(int i=0;i<n;i++){
        for(int j=0;j<p;j++){
            printf("enter the element for matrix[%d][%d] :",i,j);
            scanf("%d",&B[i][j]);
        }
    }
    multiply_matrices(A,B,C);
    printf("the resultant matrix is :\n");
    print_matrices(C);
    return 0;
}
```

5

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

```
#define m 3
#define n 3
int calculate_sparse_matrix(int matrix[m][n],int *zeros,int *non_zeros){
   for(int i=0;i<m;i++){
      for(int j=0;j<n;j++){
         if(matrix[i][j]==0){
            (*zeros)+=1;
      }else{
         (*non_zeros)+=1;
      }
   }
}
}
int main(){
   int matrix[m][n],zeros=0,non_zeros=0;
   printf("enter the element for matrix :");
   for(int i=0;i<m;i++){
      for(int j=0;j<n;j++){
         printf("enter the value at matrix[%d][%d]",i,j);
         scanf("%d",&matrix[i][j]);
      }
   }
   calculate_sparse_matrix(matrix,&zeros,&non_zeros);
   if(zeros>non_zeros){
      printf("the given matrix is a sparse matrix");
   }else{
      printf("the given matrix is not a sparse matrix");
   }
   return 0;
```

```
}
```

6

```
#include<stdio.h>
#define x 2
#define y 2
#define z 2
void sum(int A[x][y][z],int B[x][y][z],int c[x][y][z]){
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            c[i][j][k]=A[i][j][k]+B[i][j][k];
         }
      }
   }
}
void print_matrix(int matrix[x][y][z]){
      for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            printf("%d",matrix[i][j][k]);
         }
      }
      printf("\n");
   }
}

int main(){
   int A[x][y][z],B[x][y][z],result[x][y][z];
```

```
   printf("enter the elements for matrix 1:");
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            printf("enter the matrix elements A[%d][%d][%d]",i,j,k);
            scanf("%d",&A[i][j][k]);
         }
      }
   }
   printf("enter the elements for matrix 2:");
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            printf("enter the matrix elements B[%d][%d][%d]",i,j,k);
            scanf("%d",&B[i][j][k]);
         }
      }
   }
   printf("the sum is :\n");
   sum(A,B,result);
   print_matrix(result);
}
```

7

```
#include<stdio.h>
#define x 2
#define y 2
#define z 2
int max_element(int A[x][y][z],int max){
```

```
    for(int i=0;i<x;i++){
        for(int j=0;j<y;j++){
            for(int k=0;k<z;k++){
                if(A[i][j][k]>max){
                    max=A[i][j][k];
                }
            }
        }
    }
    return max;
}

int main(){
    int A[x][y][z],max=0;
    printf("enter the elements for matrix 1:");
    for(int i=0;i<x;i++){
        for(int j=0;j<y;j++){
            for(int k=0;k<z;k++){
                printf("enter the matrix elements A[%d][%d][%d]",i,j,k);
                scanf("%d",&A[i][j][k]);
            }
        }
    }
    printf("the max element is :\n");
    int result=max_element(A,max);
    printf("%d",result);
}
```

```
#include<stdio.h>
#include<stdlib.h>
#define x 2
#define y 2
#define z 2
void scalar_multiplication(int matrix[x][y][z],int result[x][y][z],int scalar){
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            result[i][j][k]=matrix[i][j][k]*scalar;
         }
      }
   }
}
void print_matrix(int matrix[x][y][z]){
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            printf("%d\t",matrix[i][j][k]);
         }
      }
      printf("\n");
   }
}

int main(){
   int matrix[x][y][z],result[x][y][z],scalar;
   printf("Enter the matrix\n");
   for(int i=0;i<x;i++){
```

```
        for(int j=0;j<y;j++){
            for(int k=0;k<z;k++){
                printf("enter the element matrix[%d][%d][%d]",i,j,k);
                scanf("%d",&matrix[i][j][k]);
            }
        }
    }
    printf("enter the value of scalar");
    scanf("%d",&scalar);
    printf("the orginal matrix is :");
    print_matrix(matrix);
    scalar_multiplication(matrix,result,scalar);
    printf("the resultant matrix is :");
    print_matrix(result);
    return 0;
}
```

9

```
#include<stdio.h>
#define x 2
#define y 2
#define z 2
void find_values(int matrix[x][y][z]){
    int pos=0,neg=0,zero=0;
    for(int i=0;i<x;i++){
        for(int j=0;j<y;j++){
            for(int k=0;k<z;k++){
                if(matrix[i][j][k]>0){
                    pos+=1;
```

```
            }else if(matrix[i][j][k]<0){
                neg+=1;
            }else{
                zero+=1;
            }
        }
    }
    printf("the count of positive values are %d\n",pos);
    printf("the count of negative values are %d\n",neg);
    printf("the count of zeros are %d\n",zero);
}

int main(){
    int matrix[x][y][z];
    printf("enter the matrix:\n");
    for(int i=0;i<x;i++){
        for(int j=0;j<y;j++){
            for(int k=0;k<z;k++){
                printf("Enter the value matrix[%d][%d][%d]:",i,j,k);
                scanf("%d",&matrix[i][j][k]);
            }
        }
    }
    printf("the results are: ");
    find_values(matrix);
    return 0;
}
```

10

```
#include<stdio.h>
#define x 2
#define y 2
#define z 2
void transpose_matrix(int matrix[x][y][z],int transpose[x][y][z]){
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            transpose[j][i][k]=matrix[i][j][k];
         }
      }
   }
}
void print_matrix(int matrix[x][y][z]){
   for(int i=0;i<x;i++){
      for(int j=0;j<y;j++){
         for(int k=0;k<z;k++){
            printf("%d",matrix[i][j][k]);
            printf("\t");
         }
      }
      printf("\n");
   }
}
int main(){
   int matrix[x][y][z],transpose[x][y][z];
```

```
    printf("enter the matrix :\n");
    for(int i=0;i<x;i++){
        for(int j=0;j<y;j++){
            for(int k=0;k<z;k++){
                printf("enter the element matrix[%d][%d][%d]",i,j,k);
                scanf("%d",&matrix[i][j][k]);
            }
        }
    }
    printf("the matrix is :\n");
    print_matrix(matrix);
    printf("the transporse matrix is :\n");
    transpose_matrix(matrix,transpose);
    print_matrix(transpose);
    return 0;
}
```