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//DSL Lab 03 Matrix



def lis_mat(m1,m,n):
    for i in range(m):
        for j in range(n):
            print(m1[i][j],end=" ")
        print()

def matrix(m,n):
    matrixlis = []
    for i in range(m):
        row = []
        for j in range(n):
            val = int(input("Enter value of matrix["+str(i)+","+str(j)+"] :
"))
            row.append(val)
        matrixlis.append(row)
    lis_mat(matrixlis, m, n)
    return matrixlis

def add_matrix(m1,m2,m,n):
    addlis = []
    for i in range(m):
        add = []
        for j in range(n):
            val = m1[i][j] + m2[i][j]
            add.append(val)
        addlis.append(add)
    lis_mat(addlis, m, n)
    return addlis

def subs_matrix(m1,m2,m,n):
    subslis = []
    for i in range(m):
        subs = []
        for j in range(n):
            val = m1[i][j] - m2[i][j]
            subs.append(val)
        subslis.append(subs)
    lis_mat(subslis, m, n)
    return subslis


def multi_matrix(m1,m2):
    import numpy as np
    multiplication = np.dot(m1,m2)
    lis_mat(multiplication,len(m1),len(m2[0]))

def transpose(m1):
     trans = [[m1[j][i] for j in range(len(m1))] for i in range(len(m1[0]))]
     lis_mat(trans,len(m1[0]),len(m1))
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m1 = int(input("Enter number of rows of matrix 1: "))
n1 = int(input("Enter number of column of matrix 1: "))

m2 = int(input("Enter number of rows of matrix 2: "))
n2 = int(input("Enter number of column of matrix 2: "))

print("Matrix 1: ")
matrix1 = matrix(m1, n1)
print("Matrix 2: ")
matrix2 = matrix(m2,n2)

otp = 24

while(otp != 0):
    print("#"*20,"MENU","#"*20)
    print("1) Addition of two matrices \n2) Subtraction of two matrices \n3)
Multiplication of two matrices \n4) Transpose of a matrix")
    otp = int(input("Enter operation to perform(0 to exit): "))
    if(otp==1):
        if(m1==m2 and n1==n2):
            print("\nAddition of matrix1 ")
            lis_mat(matrix1, m1, n1)
            print("and matrix2 ")
            lis_mat(matrix2, m1, n1)
            print("\nis : ")
            add_matrix(matrix1,matrix2,m1,n1)
        else:
            print("Addition is not possible!")
    elif(otp==2):
        if(m1==m2 and n1==n2):
            print("\nSubstraction of matrix1 ")
            lis_mat(matrix1, m1, n1)
            print("and matrix2 ")
            lis_mat(matrix2, m1, n1)
            print("\nis : ")
            subs_matrix(matrix1,matrix2,m1,n1)
        else:
            print("Substraction is not possible!")
    elif(otp==3):
        if(n1==m2):
            print("\Multiplication of matrix1 ")
            lis_mat(matrix1, m1, n1)
            print("and matrix2 ")
            lis_mat(matrix2, m1, n1)
            print("\nis : ")
            multi_matrix(matrix1,matrix2)
        else:
            print("Multiplication is not possible!")
    elif(otp==4):
        print("\nTranspose of 1st matrix: ")
        lis_mat(matrix1,m1,n1)
        print("\nis : ")
        transpose(matrix1)
        print("Transpose of 2nd matrix: ")
        lis_mat(matrix2,m2,m2)
        print("\nis : ")
        transpose(matrix2)
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else:
    print("Program ended successfully!")
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