# Matrix Operations

# 1. Print a matrix row-wise and column-wise

def print\_matrix\_row\_col(matrix):

print("Matrix printed row-wise:")

for row in matrix:

print(" ".join(map(str, row)))

print("\nMatrix printed column-wise:")

for col in range(len(matrix[0])):

for row in matrix:

print(row[col], end=" ")

print()

matrix = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

print\_matrix\_row\_col(matrix)

# 2. Print the sum of the elements in the matrix

def sum\_matrix\_elements(matrix):

return sum(sum(row) for row in matrix)

matrix = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

print("Sum of elements in the matrix:", sum\_matrix\_elements(matrix))

# 3. Find the maximum and minimum values in each row of a matrix

def max\_min\_each\_row(matrix):

for i, row in enumerate(matrix, start=1):

print(f"Row {i} -> Max: {max(row)}, Min: {min(row)}")

matrix = [

[3, 8, 1],

[4, 7, 9],

[2, 5, 6]

]

max\_min\_each\_row(matrix)

# 4. Add and subtract two matrices

def add\_matrices(matrixA, matrixB):

return [[matrixA[i][j] + matrixB[i][j] for j in range(len(matrixA[0]))] for i in range(len(matrixA))]

def subtract\_matrices(matrixA, matrixB):

return [[matrixA[i][j] - matrixB[i][j] for j in range(len(matrixA[0]))] for i in range(len(matrixA))]

def print\_matrix(matrix):

for row in matrix:

print(" ".join(map(str, row)))

matrixA = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

matrixB = [

[9, 8, 7],

[6, 5, 4],

[3, 2, 1]

]

print("Matrix A:")

print\_matrix(matrixA)

print("\nMatrix B:")

print\_matrix(matrixB)

sum\_matrix = add\_matrices(matrixA, matrixB)

print("\nSum of Matrix A and B:")

print\_matrix(sum\_matrix)

diff\_matrix = subtract\_matrices(matrixA, matrixB)

print("\nDifference of Matrix A and B:")

print\_matrix(diff\_matrix)

# 5. Calculate the sum of each row and each column in a matrix

def row\_col\_sums(matrix):

for i, row in enumerate(matrix, start=1):

print(f"Row {i} sum: {sum(row)}")

for j in range(len(matrix[0])):

col\_sum = sum(matrix[i][j] for i in range(len(matrix)))

print(f"Column {j + 1} sum: {col\_sum}")

matrix = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

row\_col\_sums(matrix)

# 6. Find the maximum and minimum values in each column of a matrix

def max\_min\_each\_column(matrix):

for j in range(len(matrix[0])):

col\_values = [matrix[i][j] for i in range(len(matrix))]

print(f"Column {j + 1} -> Max: {max(col\_values)}, Min: {min(col\_values)}")

matrix = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

max\_min\_each\_column(matrix)

# 7. Print the upper triangle and lower triangle of a matrix

def print\_upper\_lower\_triangles(matrix):

print("Upper Triangle:")

for i in range(len(matrix)):

for j in range(len(matrix[i])):

if j >= i:

print(matrix[i][j], end=" ")

else:

print(" ", end=" ")

print()

print("\nLower Triangle:")

for i in range(len(matrix)):

for j in range(len(matrix[i])):

if i >= j:

print(matrix[i][j], end=" ")

else:

print(" ", end=" ")

print()

matrix = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

print\_upper\_lower\_triangles(matrix)

# 8. Print the left and right diagonals of a matrix

def print\_diagonals(matrix):

print("Left Diagonal:")

for i in range(len(matrix)):

for j in range(len(matrix[i])):

if i == j:

print(matrix[i][j], end=" ")

else:

print(" ", end=" ")

print()

print("\nRight Diagonal:")

for i in range(len(matrix)):

for j in range(len(matrix[i])):

if i + j == len(matrix) - 1:

print(matrix[i][j], end=" ")

else:

print(" ", end=" ")

print()

matrix = [

[1, 2, 3],

[4, 5, 6],

[7, 8, 9]

]

print\_diagonals(matrix)

# 9. Sort the matrix row-wise and column-wise

def sort\_matrix(matrix):

print("Original Matrix:")

print\_matrix(matrix)

# Row-wise sort

for row in matrix:

row.sort()

# Column-wise sort

for j in range(len(matrix[0])):

column = [matrix[i][j] for i in range(len(matrix))]

column.sort()

for i in range(len(matrix)):

matrix[i][j] = column[i]

print("\nSorted Matrix:")

print\_matrix(matrix)

matrix = [

[5, 4, 7],

[1, 3, 8],

[2, 9, 6]

]

sort\_matrix(matrix)