HSC CRACKERS

Assignment on Array

Problem 1: Awesh's Image Pixel Manipulation

Awesh is developing a photo editing application and needs to implement a feature to adjust the brightness of an image. The image is represented as a grid of pixels, where each pixel value ranges from 0 to 255. To increase or decrease the brightness, Awesh needs a function that adds a given value to each pixel in the image.

Problem Statement

Given an MxN grid representing an image and an integer delta representing the brightness adjustment value, write a function to adjust the brightness of the image. The pixel values should be clamped between 0 and 255 after adjustment.

Input	Output
Grid: 100 150 200 50 100 150 Delta: 50	150 200 250 100 150 200
Grid: 0 0 0 0 0 0 Delta: 10	10 10 10 10 10 10
Grid: 255 255 255 255 255 255 Delta: -100	155 155 155 155 155 155
Grid: 10 20 30 40 50 60 Delta: -20	0 0 10 20 30 40

Problem 2: Awesh's Park Landscaping

Awesh is in charge of designing a new park. The park is represented as a grid where each cell has a certain height value. To create a visually appealing landscape, Awesh wants to flatten the park to the minimum possible height, but he can only decrease the height of each cell, never increase it. He also wants to calculate the total amount of soil removed during this process.

Problem Statement

1. Given an MxN grid representing the height of different sections of the park, write a function to:

2. Flatten the park to the minimum possible height (the minimum value in the grid).

3. Calculate the total amount of soil removed.

Input	Output
Grid: 4 3 4 3 2 3 4 3 4	Flattened Grid: 2 2 2 2 2 2 2 2 2 Soil Removed: 16
Grid: 1 1 1 1	Flattened Grid: 1 1 1 1 Soil Removed: 0
Grid: 6 5 8 7 6 9	Flattened Grid: 5 5 5 5 5 5 Soil Removed: 15

Problem 3: Awesh's Sudoku Validator

Awesh loves playing Sudoku and wants to write a program to check if a given Sudoku board is valid. A valid Sudoku board means each row, column, and each of the 3x3 subgrids must contain all digits from 1 to 9 without repetition.

Problem Statement

Given a 9x9 Sudoku board, write a function to check if the board is valid. The board is represented as a 2D array where empty cells are represented by 0.

Input	Output
5 3 0 0 7 0 0 0 0 6 0 0 1 9 5 0 0 0 0 9 8 0 0 0 0 6 0 8 0 0 0 6 0 0 0 3 4 0 0 8 0 3 0 0 1 7 0 0 0 2 0 0 0 6 0 6 0 0 0 0 2 8 0 0 0 0 4 1 9 0 0 5 0 0 0 0 8 0 0 7 9	TRUE

5 3 0 0 7 0 0 0 0 6 0 0 1 9 5 0 0 0 0 9 8 0 0 0 0 6 0 8 0 0 0 6 0 0 0 3 4 0 0 8 0 3 0 0 1 7 0 0 0 2 0 0 0 6 0 6 0 0 0 0 2 8 0 0 0 0 4 1 9 0 0 5 0 0 0 0 8 0 0 7 5	FALSE
8 3 0 0 7 0 0 0 0 6 0 0 1 9 5 0 0 0 0 9 8 0 0 0 0 6 0 8 0 0 0 6 0 0 0 3 4 0 0 8 0 3 0 0 1 7 0 0 0 2 0 0 0 6 0 6 0 0 0 0 2 8 0 0 0 0 4 1 9 0 0 5 0 0 0 0 8 0 0 7 9	FALSE
5 3 0 0 7 0 0 0 0 6 0 0 1 9 5 0 0 0 0 9 8 0 0 0 0 6 0 8 0 0 0 6 0 0 0 3 4 0 0 8 0 3 0 0 1 7 0 0 0 2 0 0 0 6 0 6 0 0 0 0 2 8 0 0 0 0 4 1 9 0 0 5 0 0 0 0 8 0 0 7 9	TRUE

Problem 4: Awesh's Image Rotator

Awesh is developing a photo editing application and needs a function to rotate images. An image can be represented as an NxN matrix. Help Awesh by writing a function that rotates the matrix 90 degrees clockwise.

Problem Statement

Given an NxN matrix, write a function to rotate it 90 degrees clockwise.

Input	Output
1 2 3 4 5 6 7 8 9	7 4 1 8 5 2 9 6 3
1 2 3 4	3 1 4 2
5 1 9 11 2 4 8 10 13 3 6 7 15 14 12 16	15 13 2 5 14 3 4 1 12 6 8 9 16 7 10 11
1	1