Assignment : Graph -3 Problems on graph Coloring

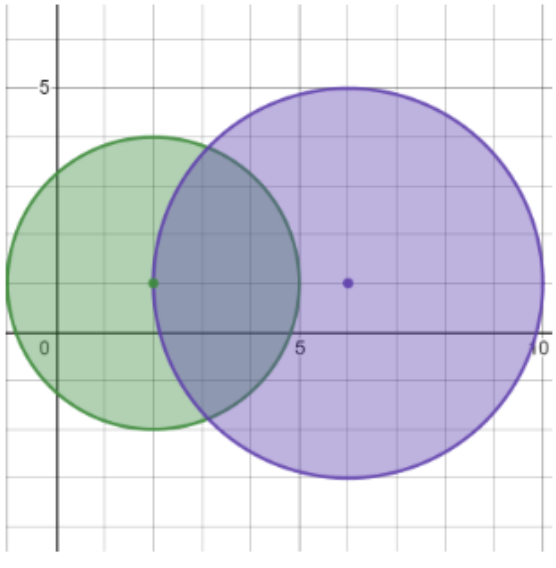
Q1 You are given a list of bombs. The range of a bomb is defined as the area where its effect can be felt. This area is in the shape of a circle with the center as the location of the bomb. The bombs are represented by a 0-indexed 2D integer array bombs where bombs[i] = [xi, yi, ri]. xi and yi denote the X-coordinate and Y-coordinate of the location of the ith bomb, whereas ri denotes the radius of its range.

You may choose to detonate a single bomb. When a bomb is detonated, it will detonate all bombs that lie in its range. These bombs will further detonate the bombs that lie in their ranges.

Given the list of bombs, return the maximum number of bombs that can be detonated if you are allowed to detonate only one bomb.

Input: bombs = [[2,1,3],[6,1,4]]
Output: 2

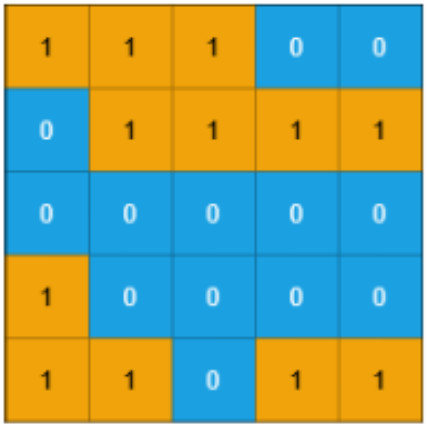
Explanation:
The above figure shows the positions and ranges of the 2 bombs.
If we detonate the left bomb, the right bomb will not be affected.
But if we detonate the right bomb, both bombs will be detonated.
So the maximum bombs that can be detonated is max(1, 2) = 2.

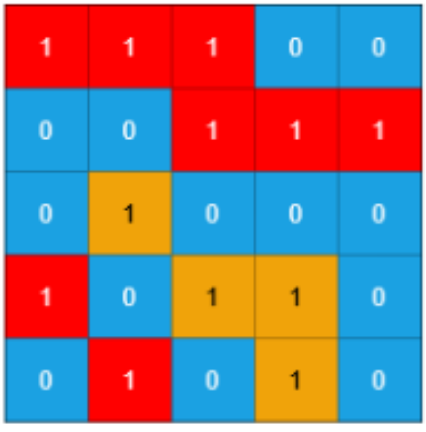


Q2 You are given two m x n binary matrices grid1 and grid2 containing only 0's (representing water) and 1's (representing land). An island is a group of 1's connected 4-directionally (horizontal or vertical). Any cells outside of the grid are considered water cells.

An island in grid2 is considered a sub-island if there is an island in grid1 that contains all the cells that make up this island in grid2.

Return the number of islands in grid2 that are considered sub-islands.





Input: grid1 = [[1,1,1,0,0],[0,1,1,1,1],[0,0,0,0,0],[1,0,0,0,0],[1,1,0,1,1]], grid2 = [[1,1,1,0,0],[0,0,1,1,1],[0,1,0,0,0],[1,0,1,1,0],[0,1,0,1,0]]
Output: 3
Explanation: In the picture above, the grid on the left is grid1 and the grid on the right is grid2. The 1s colored red in grid2 are those considered to be part of a sub-island. There are three sub-islands.

Q3 You are given a 0-indexed m x n binary matrix land where a 0 represents a hectare of forested land and a 1 represents a hectare of farmland.
To keep the land organized, there are designated rectangular areas of hectares that consist entirely of farmland. These rectangular areas are called groups. No two groups are adjacent, meaning farmland in one group is not four-directionally adjacent to another farmland in a different group.

land can be represented by a coordinate system where the top left corner of land is (0, 0) and the bottom right corner of land is (m-1, n-1). Find the coordinates of the top left and bottom right corner of each group of farmland. A group of farmland with a top left corner at (r1, c1) and a bottom right corner at (r2, c2) is represented by the 4-length array [r1, c1, r2, c2].

Return a 2D array containing the 4-length arrays described above for each group of farmland in land. If there are no groups of farmland, return an empty array. You may return the answer in any order.

Example 1:

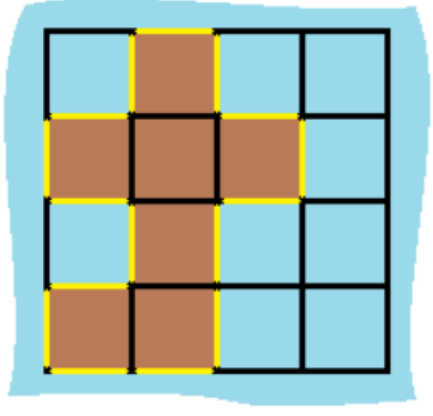
1	0	0
0	1	1
0	1	1

Input: land = [[1,0,0],[0,1,1],[0,1,1]]
Output: [[0,0,0,0],[1,1,2,2]]
Explanation:
The first group has a top left corner at land[0][0] and a bottom right corner at land[0][0].
The second group has a top left corner at land[1][1] and a bottom right corner at land[2][2].

Q4 You are given row x col grid representing a map where grid[i][j] = 1 represents land and grid[i][j] = 0 represents water.
Grid cells are connected horizontally/vertically (not diagonally). The grid is completely surrounded by water, and there is exactly one island (i.e., one or more connected land cells).

The island doesn't have "lakes", meaning the water inside isn't connected to the water around the island. One cell is a square with side length 1. The grid is rectangular, width and height don't exceed 100. Determine the perimeter of the island.

Example 1:



Input: grid = [[0,1,0,0],[1,1,1,0],[0,1,0,0],[1,1,0,0]]
Output: 16
Explanation: The perimeter is the 16 yellow stripes in the image above.