Mini-Project Milestone 2

Due: June 11, 11:30pm

Recall that in Step 2 of Milestone 1 we wrote a function for finding the list of land cells. Let's call this function FindLandCells, and its output LandCell_ List. This list of land cells can look like this:

$$\text{LandCell\_ List} = [10, 11, 25, 12, 50, 51, 80, 81, 82]$$

(this is only an example, it does not correspond to some specific input).
Now this lists can be further broken into **islands**. So, we have something that looks like this:

$$\text{Island\_ List} = [[10, 11, 12], [25], [50, 51], [80, 81, 82]]$$

You see how all the cells from the original list appear in the second data structure, which is a list of lists, with each list being an island. Observe how cells belonging to the same island (e.g. cell 12), can be mixed up with other islands in LandCell_ List. In other words, one island's cells do not have to be in contiguous positions in LandCell_ List.

In this milestone we will write functions to help find the list of islands.

Step 6. Write a function GenerateNeighbors(t_1, n, m), that takes one cell number t_1 (and also the dimensions), and returns the numbers for the neighbors of t_1 in the grid. Notice that t_1 can have $2, 3$ or 4 neighbors.

Step 7. Write a function ExploreIsland(t_1, n, m). This function should start from cell t_1, and construct a list of cells that are in the same island as t_1. (Hint: t_1 can add itself to a **dictionary** representing the island, and also its neighbors, then the neighbors should recursively do the the same. But when new neighbors are inserted in the dictionary, we should first check if they are already in it. The process should terminate when it's not possible to add more cells to the dictionary, meaning that we found the island. Finally the function should return a list with the cells on the island)

Step 8. Write a function FindIslands that reads the list LandCell_ List and converts its to Island_ List as explained above. The idea for this step is to scan the list of land cells, and call repeatedly the ExploreIsland function.

Note: This is part of the mini-project and credit will be given when it is completed. This part is worth about 25% of the miniproject grade.