/
Student ID: 30391113
Student Name: An Ju
Date: 08/01/2020
Assignment2 Part D
/

In part B I chose brute-force approach to implement task 1.

In this question the number of grids in the board should be *rows*columns*, since every grid will be replaced by either '+', '-' or 'X', this means there will be *(rows*columns)/2* number of magnets placed on the board. Each value in the set will change two grids, which is one magnet, therefore, in every possible solution we need to have *(rows*columns)/2* elements from 0 to 2. The only three possible states are 0,1,2, so every element in one solution will have three possibility. And there are *(rows*columns)/2* elements in each possible solution, which leads to all possible solution to have *3^(rows*columns)/2* possible solutions, so the Big O notation will be O(3^n), where n equals to *(rows*columns)/2.*

At first, I was trying to use nesting loop with the range of 3 to append the element, but it doesn't work. Then I though in the lecture we use binary to represent two states problem, in this case, the set values are three (0,1,2) which can be represent by ternary, so I convert each possible solution from decimal to ternary. Since the decimal numbers from 0 to *3^(rows*columns)/2* are different the corresponding ternary number will be changed by digit too.

In the *bruteforce* function, it will call the *dec2base3_sol* function to convert each decimal number to ternary and append it in the *all_sol* list for all possible solution. Since the solution will only have *(rows*columns)/2* elements, when the decimal number is *3^(rows*columns)/2*, there will be *(rows*columns)/2+1* elements in that solution, so the range will be from 0 to *3^(rows*columns)/2-1*, which in python is (*3^(rows*columns)/2*). Dec2base3_sol function will convert the decimal number to ternary by appending the remainder of the decimal number divided by three and keep the exact division to be divided. Finally, when the decimal number is 1, the exact division will be 0. In this case, the number 1 as remainder has already been append in the list and the new decimal number is 0, the variable *temp* will be -1 so it can change the flag to false to end the loop. Then, reverse the solution list to get the ternary number.

I'm certain this way will give the correct cause every possible solution has been generated in the list and tried whether it's the correct solution for the board. In brute-force approach, I have got all the possible solution and tried them all, then remove the invalid ones to get the final answer.