CSE221 SEC20 LAB07 CODE EXPLANATION

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Task01

I use DSU to solve this problem. Initially, I consider everyone ~~a~~ their own friend. When two people become friends, I merged them together and update their parent and size of their friend circle. Iteratively I go thorough each friendship query and determine the size of the friend circle for each pair of friends.

Task02

I use kruskal's algorithm with DSU to solve this problem. Initially, I sort the roads based on their maintenance costs. Then, I iterates through the sorted roads and add them to the set if they connect two disjoint sets of cities, it ensures that I am chosing the roads with minimum total maintenance cost. Finally, I calculate the total maintenance cost of this minimum cost set of roads.

Task03

I use DP to solve this problem. I initialize a list to store the number of ways for each step, starting from the base cases of 1 & 2. Then, I iterate through each step and calculate the number of ways to reach that step by adding the counts of the previous two steps. Lastly, I return the count of ways to reach the Nth step.

Yes, I can relate the recurrence relation of this problem with fibonacci numbers, where each steps count depends on the counts of the two preceding steps.

Task04

I use DP to solve this problem. I use a 2D array where each cell represents the minimum number of coins needed for a specific amount using a subset of the available coins. By iterating through each coin denomination and amount, it fills the array using a bottom-up approach,. considering either including or excluding the current coin denomination to reach the target amount. Finally, it returns the value in the bottom-right cell of the array, which represents the minimum number of coins. If it's not possible to make up the target amount, I return -1.