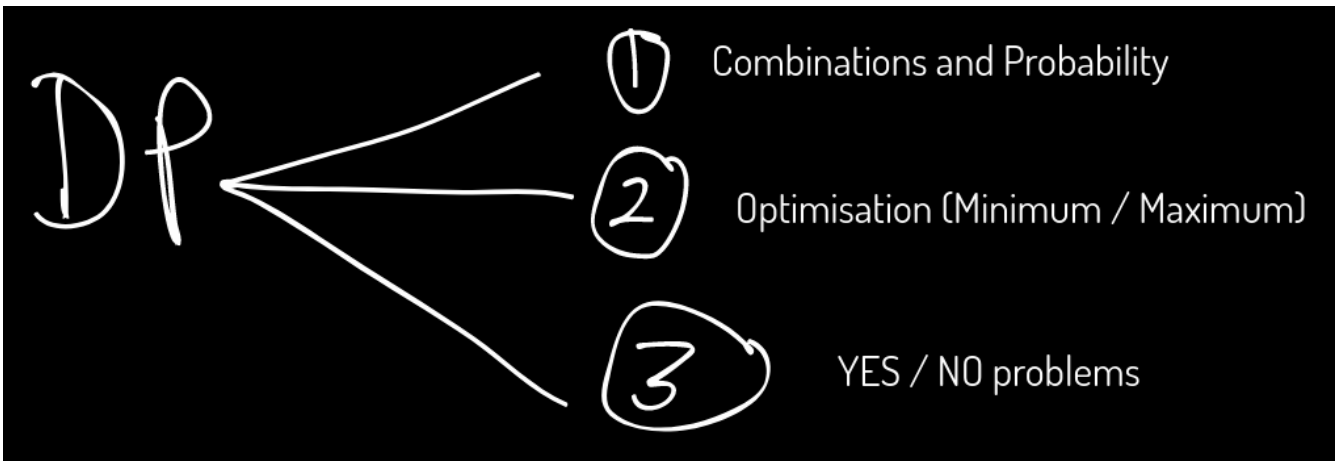
Solving medium DP Problems

Recap

For DP, we need:-
1. Recursive relation (with base case)
2. Overlapping subproblems



Basics of Combinatorics

Product Rule:

If a job A can be done in **m ways** and after it is done, another job B can be done in **n ways**, then total number of ways to do both A **AND** B is m*n ways.
(Independent jobs)

Eg. You need to form a team for ICPC of 1 mathematician, 1 programmer and 1 gamer. There are a total of 10 mathematicians, 15 programmers and 5 gamers in your college. In how many ways, can you form a team ?
- 10 ways to select a mathematician
- 15 ways to select a programmer
- 5 ways to select a gamer
Total ways = 10 x 15 x 5

Sum Rule

If a job A can be done in m ways and another job B can be done in n ways, then total number of ways to do both either A **OR** B is m+n ways.

Eg. You need to form a team for ICPC of 1 mathematician or 1 programmer or 1 gamer. There are a total of 10 mathematicians, 15 programmers and 5 gamers in your college. In how many ways, can you form a team ?

- 10 ways to select a mathematician
- 15 ways to select a programmer
- 5 ways to select a gamer
Total ways = 10 + 15 + 5 = 30

Problem 1: Array Description

Link: https://cses.fi/problemset/task/1746/

Link to my code: https://cses.fi/paste/24fd50ca8e4cb856203207/

Problem 2: Coin Combinations I

Link: https://cses.fi/problemset/task/1635
Link to my code: https://cses.fi/paste/33c8a1398ac7c753203fba/

Problem 3: Coin Combinations II

Link: https://cses.fi/problemset/task/1636
Link to my code: https://cses.fi/paste/4a0ca5f0bd1fe8dc204113/

Problem 4: Exponential Subsets (Hackerearth)

Link:
https://www.hackerearth.com/practice/algorithms/dynamic-programming/2-dimensional/practice-problems/algorithm/exponential-subset-f78d066f/
Link to my code:
https://www.hackerearth.com/submission/key/1899bbc5d4f744a49e3d6970000c34d6/

HomeWork

Problem 5: Two Sets II

Link: https://cses.fi/problemset/task/1093
Link to my code: https://cses.fi/paste/9b9f6fc873b99b19140b72/