EDITORIAL

Codeforces:-Card Game(808F)

[Problem Link]

Prerequisite - Binary search ,graphs, Max-Flows

The most tricky part of the problem is how to check if some set of cards allows us to build a deck with the required power (not taking the levels of cards into account).

Suppose we have not more than one card with magic number 1 (if there are multiple cards with this magic number, then we obviously can use only one of these). Then two cards may conflict only if one of them has an odd magic number, and another has an even magic number — otherwise their sum is even and not less than 4, so it's not a prime number.

This allows us to solve this problem as follows:

Construct a bipartite graph: each vertex represents a card, and two vertices are connected by an edge if the corresponding pair of cards can't be put in a deck. Then we have to find the maximum weight of independent set in this graph.

This can be solved using maximum flow algorithm:-

construct a network where source is connected with every "odd" vertex (a vertex that represents a card with an odd magic number) by an edge with

capacity equal to the power of this card; then connect every "odd" vertex to all "even" vertices that are conflicting with this vertex by edges with infinite capacities; and then connect every "even" vertex to the sink by an edge with capacity equal to the power of the card (all edges have to be directed). Then the maximum power of the deck is equal to $sum - mincut$, where sum is the sum of all powers and $mincut$ is the minimum cut value between the source and the sink (which is equal to the maximum flow).

This allows us to check if we can build a deck of required power using only some set of cards (for example, only cards with level less than or equal to some x).

Author’s code :- Coded by Enigma27