Graph and Properties

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Google Code Jam 2009 Round 2
Stock Charts

You have n stock prices, each has a line segment connecting $(0, p_0)$, $(1, p_1)$, $(2, p_2)$, …, (k, p_k)

You want to group several stocks into overlaid chart. Same stock in the same chart must not intersect

Determine minimum number of charts

$$2 \leq k \leq 25$$
$$1 \leq n \leq 100$$

There is a set of N positive integers less than b. For all $0 \le k < 5$, the number of integers x in the set that satisfies x % 5 = k is the same You are given Q hints, each in the form of: there are U_i integers in the set not more than V_i.

Determine whether such set exists
$5 \le N$, $b \le 1e4$, $1 \le q \le 1e4$

hall's theorem can be used to avoid maxflow solution

Google Code Jam Round 3
2022
Mascot Maze

Given a directed graph with N vertices. Each vertex has 2 outgoing edges. Color the graph with 13 colours s.t. for all u->v->w have three different colours

$3 \leq N \leq 1e5$

There are N sets, each is a subset of {1..N} and has a cost to be chosen.
It is guaranteed that a union of any k sets has at least k elements

Choose several sets with minimum total cost such that the union of the sets has the same number of elements as the number of chosen sets.

$1 \leq N \leq 300$

```
input

3
1 1
2 2 3
1 3
10 20 -3

output

-3
```

```
input

5
2 1 2
2 2 3
2 3 4
2 4 5
2 5 1
1 -1 1 -1 1

output

0
```

```
input

5
2 1 2
2 2 3
2 3 4
2 4 5
2 5 1
-1 1 -1 1 -1

output

-1
```

get a perfect matching. create another graph G2 containing only the sets. add an edge from u to v if v is matched to some node that is adjacent to u.

now we want to choose a subset of nodes in G2 such that there is no chosen node that has outdegree to a non-chosen node

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Q&A?