(Adv.) Competitive Programming

Submit until 12.07.2019 13:30, via the judge interface

HPI Hasso Plattner Institut
Digital Engineering · Universität Potsdam

Problem: minigolf2 (1 second timelimit)

Your minigolf course has long dried out and has expanded into a large field with many different courses. Each day, many different groups play on your courses. The skill level often varies drastically within each group, leading to a lot of frustration. Over time, you have developed a precise judgement of how well a person will play a course before you even see them play. Now you want to use this skill to make the experience less frustrating for your customers.

While watching your customers play, you noticed the following: players only compare their results for a hole to that of the player that played just before them, either on the same hole or the previous one. If the difference in shots needed is large, they get frustrated, because the game is either too easy or too hard. Overall, a players frustration is based the largest such difference. Your goal is to minimize the maximum frustration under the players in each group.

Since you cannot change the groups that want to play at your courses, the only thing you can do is suggest an order in which the players play at each hole. This order stays the same for each hole in the course. Can you find the playing order that minimizes the groups frustration?

Input The first line contains n ($2 \leq n \leq 16$), the number of players, and h ($1 \leq h \leq 10^4$), the number of holes. The next n lines each contain h integers: the number of shots each player needs for each hole.

Output Output the smallest possible maximal difference that you can achieve by suggesting a playing order to the group.

Sample input

```
3 1
2
3
1
```

Sample output

```
1
```

```
3 2
3 3
1 1
2 2
```

```
2
```

```
3 3
1 3 5
2 3 1
4 2 5
```

```
4
```