课后作业 1

课后作业

1. 排列 II

给定一个整数n（$1 \le n \le 8$），以及n个整数$a_1, a_2, ..., a_n$（$1 \le a_i \le 10^9$）。按字典序从小到大输出$a_1, ..., a_n$所有可能的排列。

输入样例：

```
4
4 1 2 1
```

输出样例：

```
1 1 2 4
1 1 4 2
1 2 1 4
1 2 4 1
1 4 1 2
1 4 2 1
2 1 1 4
2 1 4 1
2 4 1 1
4 1 1 2
4 1 2 1
4 2 1 1
```

2. 组合

给定两个整数n, k（$1 \le k \le n \le 20$），以及n个各不相同的整数$a_1, a_2, ..., a_n$（$1 \le a_i \le 10^9$）。按字典序从小到大输出$a_1, ..., a_n$中选择k个可以得到的所有可能的组合，每种组合均按从小到大顺序输出。

输入样例：

```
4 2
4 8 1 2
```

输出样例：

```
1 2
1 4
1 8
2 4
2 8
4 8
```

3. 棋盘路线 II

有一$n \times m$（$1 \le n, m \le 2000$）的棋盘，你需要从左下角的格子$(1,1)$走到右上角的格子(n,m)，每一步只能向上或向右走一格。方阵中有K（$1 \le K \le \min(n \times m, 10^5)$）个方格不能经过。给定$n, m, K$，以及$K$个不能经过的方格的坐标，求不同路线的数量。结果对$10^9 + 7$取模。

输入样例：

```
3 4 2
2 4
2 2
```

输出样例：

```
5
```

4. 马的遍历

给定一个$N \times M$（$1 \le N, M \le 1000$）的棋盘，求从第x行第y列的方格（$1 \le x \le N, 1 \le y \le M$）出发走到所有方格所需要的最小步数，或输出$-1$代表无法到达。

输入样例：

```
3 3 1 1
```

输出样例：

```
0 3 2
3 -1 1
2 1 4
```

5. [NOIP2018 提高组] 旅行

P5022 [NOIP2018 提高组] 旅行 - 洛谷 | 计算机科学教育新生态 (luogu.com.cn)

6. [NOIP2017 提高组] 奶酪

P3958 [NOIP2017 提高组] 奶酪 - 洛谷 | 计算机科学教育新生态 (luogu.com.cn)

- 🥦 please try to use BFS instead.

7. (USACO 2014 March – Bronze 3) Cow Art

[Brian Dean, 2014]

A little known fact about cows is the fact that they are red-green colorblind, meaning that red and green look identical to them. This makes it especially difficult to design artwork that is appealing to cows as well as humans.

Consider a square painting that is described by an N x N grid of characters (1 <= N <= 100), each one either R (red), G (green), or B (blue). A painting is interesting if it has many colored "regions" that can be distinguished from each-other. Two characters belong to the same region if they are directly adjacent (east, west, north, or south), and if they are indistinguishable in color. For example, the painting

```
RRRBB
GGBBB
BBBRR
BBRRR
RRRRR
```

has 4 regions (2 red, 1 blue, and 1 green) if viewed by a human, but only 3 regions (2 red-green, 1 blue) if viewed by a cow.

Given a painting as input, please help compute the number of regions in the painting when viewed by a human and by a cow.

PROBLEM NAME: cowart

INPUT FORMAT:

* Line 1:   The integer N.

* Lines 2..1+N: Each line contains a string with N characters, describing one row of a painting.

SAMPLE INPUT (file cowart.in):

```
5
RRRBB
GGBBB
BBBRR
BBRRR
RRRRR
```

OUTPUT FORMAT:

* Line 1: Two space-separated integers, telling the number of regions in the painting when viewed by a human and by a cow.

SAMPLE OUTPUT (file cowart.out):

```
4 3
```

8. (USACO 2015 February – Bronze 3) Cow Hopscotch (Bronze)

Just like humans enjoy playing the game of Hopscotch, Farmer John's cows have invented a variant of the game for themselves to play. Being played by clumsy animals weighing nearly a ton, Cow Hopscotch almost always ends in disaster, but this has surprisingly not deterred the cows from attempting to play nearly every afternoon.

The game is played on an R by C grid (2 <= R <= 15, 2 <= C <= 15), where each square is colored either red or blue. Cows start in the top-left square and move to the bottom-right square by a sequence of jumps, where a jump is valid if and only if

1) You are jumping to a square of a different color,

2) The square that you are jumping to is at least one row below the current square that you are on, and

3) The square that you are jumping to is at least one column to the right of the current square that you are on.

Please help the cows compute the number of different possible sequences of valid jumps that will take them from the top-left square to the bottom-right square.

INPUT FORMAT: (file hopscotch.in)

The first line contains the two integers R and C. The next R lines will each contain C characters. Each character is either 'R' or a 'B', indicating a red square or a blue square.

OUTPUT FORMAT: (file hopscotch.out)

Output the number of different ways one can jump from the top-left square to the bottom-right square.

SAMPLE INPUT:

```
4 4
RRRR
RRBR
RBBR
RRRR
```

SAMPLE OUTPUT:

```
3
```

[Problem credits: Nick Wu, 2015]