

Stock Charts

Problem

You're in the middle of writing your newspaper's end-of-year economics summary, and you've decided that you want to show a number of charts to demonstrate how different stocks have performed over the course of the last year. You've already decided that you want to show the price of n different stocks, all at the same k points of the year.

A *simple chart* of one stock's price would draw lines between the points $(0, \text{price}_0)$, $(1, \text{price}_1)$, ..., $(k-1, \text{price}_{k-1})$, where price_i is the price of the stock at the i th point in time.

In order to save space, you have invented the concept of an *overlaid chart*. An overlaid chart is the combination of one or more simple charts, and shows the prices of multiple stocks (simply drawing a line for each one). In order to avoid confusion between the stocks shown in a chart, the lines in an overlaid chart may not cross or touch.

Given a list of n stocks' prices at each of k time points, determine the minimum number of overlaid charts you need to show all of the stocks' prices.

Input

The first line of input will contain a single integer T , the number of test cases. After this will follow T test cases on different lines, each of the form:

```
n k
price0,0 price0,1 ... price0,k-1
price1,0 price1,1 ... price1,k-1
...
pricen-1,0 pricen-1,1 ... pricen-1,k-1
```

Where $\text{price}_{i,j}$ is an integer, the price of the i th stock at time j .

Output

For each test case, a single line containing "Case #X: Y", where X is the number of the test-case (1-indexed) and Y is the minimum number of overlaid charts needed to show the prices of all of the stocks.

Limits

Memory limit: 1 GB.
 $1 \leq T \leq 100$
 $2 \leq k \leq 25$
 $0 \leq \text{price}_{i,j} \leq 1000000$

Small Input

Time limit: 20 seconds.
 $1 \leq n \leq 16$

Large Input

Time limit: 30 seconds.

$1 \leq n \leq 100$

Sample

Sample Input

```
3
3 4
1 2 3 4
2 3 4 6
6 5 4 3
3 3
5 5 5
4 4 6
4 5 4
5 2
1 1
2 2
5 4
4 4
4 1
```

Sample Output

```
Case #1: 2
Case #2: 3
Case #3: 2
```