Kick Start 2019 - Round F

Teach Me

Problem

Here at Google we love teaching new skills to each other! There are **N** employees at Google, numbered from 1 to **N**. There are a total of **S** different skills, numbered from 1 to **S**. Each employee knows up to 5 different skills.

The i-th employee can *mentor* the j-th employee if there is a skill that the i-th employee knows that the j-th employee does not know. How many ordered pairs (i, j) are there where the i-th employee can mentor the j-th employee?

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. The first line of each test case gives the two integers **N** and **S**, which are the number of employees and the number of skills respectively.

The next **N** lines describe the skills that each employee knows. The i-th of these lines begins with an integer $\mathbf{C_i}$ which is the number of skills the i-th employee knows. Then, $\mathbf{C_i}$ integers follow on the same line. The j-th of these integers is $\mathbf{A_{ij}}$ indicating that the i-th employee knows the skill $\mathbf{A_{ij}}$.

Output

For each test case, output one line containing `Case #x: y`, where `x` is the test case number (starting from 1) and `y` is the number of ordered pairs (i, j) where the i-th employee can mentor the j-th employee.

Limits

Time limit: 40 seconds per test set.
Memory limit: 1GB.
$1 \leq \mathbf{T} \leq 100$.
$1 \leq \mathbf{S} \leq 1000$.
$1 \leq \mathbf{C_i} \leq 5$ for all i.
$1 \leq \mathbf{A_{ij}} \leq \mathbf{S}$ for all i and j.
$\mathbf{A_{ij}} \neq \mathbf{A_{ik}}$ for all $j \neq k$.

Test set 1 (Visible)

$2 \leq \mathbf{N} \leq 500$.

Test set 2 (Hidden)

$2 \leq \mathbf{N} \leq 5 \times 10^4$.

Sample

Sample Input

```
2
4 100
4 80 90 100 5
1 90
1 80
3 80 90 100
3 30
4 10 11 12 13
4 10 11 12 13
5 25 26 27 28 29
```

Sample Output

```
Case #1: 7
Case #2: 4
```

In Sample case #1:

- (1, 2) is a valid pair since employee 1 knows the skill 100 (also 5 and 80), while employee 2 does not.
- (1, 3) is a valid pair since employee 1 knows the skill 100 (also 5 and 90), while employee 3 does not.
- (1, 4) is a valid pair since employee 1 knows the skill 5, while employee 4 does not.
- (2, 3) is a valid pair since employee 2 knows the skill 90, while employee 3 does not.
- (3, 2) is a valid pair since employee 3 knows the skill 80, while employee 2 does not.
- (4, 2) is a valid pair since employee 4 knows the skill 100 (also 80), while employee 2 does not.
- (4, 3) is a valid pair since employee 4 knows the skill 100 (also 90), while employee 3 does not.

In total, there are 7 valid pairs, so the answer is 7.

In Sample case #2:

- (1, 3) is a valid pair since employee 1 knows the skill 10 (also 11, 12 and 13), while employee 3 does not.
- (2, 3) is a valid pair since employee 2 knows the skill 10 (also 11, 12 and 13), while employee 3 does not.
- (3, 1) is a valid pair since employee 3 knows the skill 28 (also 25, 26, 27 and 29), while employee 1 does not.
- (3, 2) is a valid pair since employee 3 knows the skill 27 (also 25, 26, 28 and 29), while employee 2 does not.

In total, there are 4 valid pairs, so the answer is 4.