Plates (9pts, 15pts)

Competitive Submissions

You have not attempted this problem.

Last updated: Mar 22 2020, 12:15

Problem

Dr. Patel has **N** stacks of plates. Each stack contains **K** plates. Each plate has a positive *beauty value*, describing how beautiful it looks.

Dr. Patel would like to take exactly **P** plates to use for dinner tonight. If he would like to take a plate in a stack, he must also take all of the plates above it in that stack as well.

Help Dr. Patel pick the **P** plates that would maximize the total sum of beauty values.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a line containing the three integers **N**, **K** and **P**. Then, **N** lines follow. The i-th line contains **K** integers, describing the beauty values of each stack of plates from top to bottom.

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 maximum total sum of beauty values that Dr. Patel could pick.

Limits

Time limit: 20 seconds per test set.  
Memory limit: 1GB.  
1 ≤ **T** ≤ 100.  
1 ≤ **K** ≤ 30.  
1 ≤ **P** ≤ **N** \* **K**.  
The beauty values are between 1 and 100, inclusive.

Test set 1

1 ≤ **N** ≤ 3.

Test set 2

1 ≤ **N** ≤ 50.

Sample

|  |  |
| --- | --- |
| Input | Output |
| 2  2 4 5  10 10 100 30  80 50 10 50  3 2 3  80 80  15 50  20 10 | Case #1: 250  Case #2: 180 |

In Sample Case #1, Dr. Patel needs to pick **P** = 5 plates:

* He can pick the top 3 plates from the first stack (10 + 10 + 100 = 120).
* He can pick the top 2 plates from the second stack (80 + 50 = 130) .

In total, the sum of beauty values is 250.

In Sample Case #2, Dr. Patel needs to pick **P** = 3 plates:

* He can pick the top 2 plates from the first stack (80 + 80 = 160).
* He can pick no plates from the second stack.
* He can pick the top plate from the third stack (20).

In total, the sum of beauty values is 180.

Allocation (5pts, 7pts)

#### Competitive Submissions

You have not attempted this problem.

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### Problem

There are **N** houses for sale. The i-th house costs **Ai** dollars to buy. You have a budget of **B** dollars to spend.

What is the maximum number of houses you can buy?

### Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a single line containing the two integers **N** and **B**. The second line contains **N** integers. The i-th integer is **Ai**, the cost of the i-th house.

### 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 maximum number of houses you can buy.

### Limits

Time limit: 15 seconds per test set.  
Memory limit: 1GB.  
1 ≤ **T** ≤ 100.  
1 ≤ **B** ≤ 105.  
1 ≤ **Ai** ≤ 1000, for all i.

#### Test set 1

1 ≤ **N** ≤ 100.

#### Test set 2

1 ≤ **N** ≤ 105.

### Sample

|  |  |
| --- | --- |
| Input | Output |
| 3  4 100  20 90 40 90  4 50  30 30 10 10  3 300  999 999 999 | Case #1: 2  Case #2: 3  Case #3: 0 |

In Sample Case #1, you have a budget of 100 dollars. You can buy the 1st and 3rd houses for 20 + 40 = 60 dollars.  
In Sample Case #2, you have a budget of 50 dollars. You can buy the 1st, 3rd and 4th houses for 30 + 10 + 10 = 50 dollars.  
In Sample Case #3, you have a budget of 300 dollars. You cannot buy any houses (so the answer is 0).

**Note:** Unlike previous editions, in Kick Start 2020, all test sets are visible verdict test sets, meaning you receive instant feedback upon submission

Workout (11pts, 18pts)

Competitive Submissions

You have not attempted this problem.

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Problem

Tambourine has prepared a fitness program so that she can become more fit! The program is made of **N** sessions. During the i-th session, Tambourine will exercise for **Mi** minutes. The number of minutes she exercises in each session are *strictly increasing*.

The *difficulty* of her fitness program is equal to the maximum difference in the number of minutes between any two consecutive training sessions.

To make her program less difficult, Tambourine has decided to add up to **K** additional training sessions to her fitness program. She can add these sessions anywhere in her fitness program, and exercise any positive integer number of minutes in each of them. After the additional training session are added, the number of minutes she exercises in each session must still be strictly increasing. What is the minimum difficulty possible?

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a line containing the two integers **N** and **K**. The second line contains **N** integers, the i-th of these is **Mi**, the number of minutes she will exercise in the i-th session.

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 minimum difficulty possible after up to **K** additional training sessions are added.

Limits

Time limit: 20 seconds per test set.  
Memory limit: 1GB.  
1 ≤ **T** ≤ 100.  
For at most 10 test cases, 2 ≤ **N** ≤ 105.  
For all other test cases, 2 ≤ **N** ≤ 300.  
1 ≤ **Mi** ≤ 109.  
**Mi** < **Mi+1** for all i.

Test set 1

**K** = 1.

Test set 2

1 ≤ **K** ≤ 105.

Samples

|  |  |
| --- | --- |
| Input 1 | Output 1 |
| 1  3 1  100 200 230 | Case #1: 50 |

|  |  |
| --- | --- |
| Input 2 | Output 2 |
| 3  5 2  10 13 15 16 17  5 6  9 10 20 26 30  8 3  1 2 3 4 5 6 7 10 | Case #1: 2  Case #2: 3  Case #3: 1 |

Sample #1

In Case #1: Tambourine can add up to one session. The added sessions are marked in bold: 100 **150** 200 230. The difficulty is now 50.

Sample #2

In Case #1: Tambourine can add up to six sessions. The added sessions are marked in bold: 9 10 **12 14 16 18** 20 **23** 26 **29** 30. The difficulty is now 3.

In Case #2: Tambourine can add up to three sessions. The added sessions are marked in bold: 1 2 3 4 5 6 7 **8 9** 10. The difficulty is now 1. Note that Tambourine only added two sessions.

* **Note #1:** Only Sample #1 is a valid input for Test set 1. Consequently, Sample #1 will be used as a sample test set for your submissions.
* **Note #2:** Unlike previous editions, in Kick Start 2020, all test sets are visible verdict test sets, meaning you receive instant feedback upon submission

Bundling (14pts, 21pts)

Competitive Submissions

You have not attempted this problem.

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Problem

Pip has **N** strings. Each string consists only of letters from A to Z. Pip would like to bundle their strings into *groups* of size **K**. Each string must belong to exactly one group.

The *score* of a group is equal to the length of the longest prefix shared by all the strings in that group. For example:

* The group {RAINBOW, RANK, RANDOM, RANK} has a score of 2 (the longest prefix is 'RA').
* The group {FIRE, FIREBALL, FIREFIGHTER} has a score of 4 (the longest prefix is 'FIRE').
* The group {ALLOCATION, PLATE, WORKOUT, BUNDLING} has a score of 0 (the longest prefix is '').

Please help Pip bundle their strings into groups of size **K**, such that the sum of scores of the groups is maximized.

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a line containing the two integers **N** and **K**. Then, **N** lines follow, each containing one of Pip's strings.

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 maximum sum of scores possible.

Limits

Time limit: 20 seconds per test set.  
Memory limit: 1GB.  
1 ≤ **T** ≤ 100.  
2 ≤ **N** ≤ 105.  
2 ≤ **K** ≤ **N**.  
**K** divides **N**.  
Each of Pip's strings contain at least one character.  
Each string consists only of letters from A to Z.

Test set 1

Each of Pip's strings contain at most 5 characters.

Test set 2

The total number of characters in Pip's strings across all test cases is at most 2 × 106.

Samples

|  |  |
| --- | --- |
| Input 1 | Output 1 |
| 2  2 2  KICK  START  8 2  G  G  GO  GO  GOO  GOO  GOOO  GOOO | Case #1: 0  Case #2: 10 |

|  |  |
| --- | --- |
| Input 2 | Output 2 |
| 1  6 3  RAINBOW  FIREBALL  RANK  RANDOM  FIREWALL  FIREFIGHTER | Case #1: 6 |

Sample #1

In Case #1, Pip can achieve a total score of 0 by make the groups:

* {KICK, START}, with a score of 0.

In Case #2, Pip can achieve a total score of 10 by make the groups:

* {G, G}, with a score of 1.
* {GO, GO}, with a score of 2.
* {GOO, GOO}, with a score of 3.
* {GOOO, GOOO}, with a score of 4.

Sample #2

In Case #1, Pip can achieve a total score of 6 by make the groups:

* {RAINBOW, RANK, RANDOM}, with a score of 2.
* {FIREBALL, FIREWALL, FIREFIGHTER}, with a score of 4.
* **Note #1:** Only Sample #1 is a valid input for Test set 1. Consequently, Sample #1 will be used as a sample test set for your submissions.
* **Note #2:** Unlike previous editions, in Kick Start 2020, all test sets are visible verdict test sets, meaning you receive instant feedback upon submission.