JavaSummer 18 Class 12 HW

Write a Java Program to solve each one of the problem. Please name your project as **mention in the question**. Save all your project into one folder called **firtsname_lastname_C12_HW** and compress the file and upload into the Google Class Room

Train Swapping

At an old railway station, you may still encounter one of the last remaining "train swappers". A train swapper is an employee of the railroad, whose sole job it is to rearrange the carriages of trains.

Once the carriages are arranged in the optimal order, all the train driver has to do is drop the carriages off, one by one, at the stations for which the load is meant.

The title "train swapper" stems from the first person who performed this task, at a station close to a railway bridge. Instead of opening up vertically, the bridge rotated around a piller in the center of the river. After rotating the bridge 90 degrees, boats could pass left or right. The first train swapper had discovered that the bridge could be operated with *at most two* carriages on it. By rotating the bridge 180 degrees, the carriages switched place, allowing him to rearrange the carriages (as a side effect, the carriages then faced the opposite directions, but train carriages can move either way, so who cares).

Now that almost all train swappers have died out, the railway company would like to automate their operation. Part of the program to be developed is a routine which decides, for a given train, the least number of swaps of two adjacent carriages necessary to order the train. Your assignment is to create a routine that computes the minimal number of swaps.

Input specification

The input contains on the first line the number of test cases (*N*). Each test case consists of two input lines. The first line of a test case contains an integer *L*, determining the length of the train ($0 \leq L \leq 50$). The second line of a test case contains a permutation of the numbers 1 through *L*, indicating the current order of the carriages. The carriages should be ordered such that carriage 1 comes first, then 2, etc., with carriage *L* coming last.

Output specification

For each test case output the sentence: "`Optimal train swapping takes` *`S`* `swap(s).`" where *S* is an integer representing the minimal number of swaps to order the train.

Sample input

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

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Sample output

```
Optimal train swapping takes 1 swap(s).
Optimal train swapping takes 6 swap(s).
Optimal train swapping takes 1 swap(s).
```

Time on task

You have been asked by a parental unit to do your chores.

Each chore takes a certain amount of time, but you may not have enough time to do all of your chores, since you can only complete one chore at a time. You can do the chores in any order that you wish.

What is the largest amount of chores you can complete in the given amount of time?

Input

The first line of input consists of an integer T ($0 \leq T \leq 100000$), which is the total number of minutes you have available to complete your chores.

The second line of input consists of an integer C ($0 \leq C \leq 100$), which is the total number of chores that you may choose from. The next C lines contain the (positive integer) number of minutes required to do each of these chores. You can assume that each chore will take at most 100000 minutes.

Output

The output will be the maximum number of chores that can be completed in time T.

Sample Input 1

```
6
3
3
6
3
```

Sample Output 1

```
2
```

Explanation

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Chores must be completed in at most 6 minutes. There are 3 chores available. The first chore takes 3 minutes. The second chore takes 6 minutes. The third chore takes 3 minutes. The answer is 2 since only 2 of these chores can be completed in 6 minutes of time. Specifically, the first and last chore can be completed in the allowable time. It is not possible to complete all 3 chores in 6 minutes.

Sample Input 2

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

Sample Output 2

```
3
```

Explanation

Tasks 3, 4, and 5 can be completed in 6 minutes. It is not possible to complete more than 3 tasks in 6 minutes.