

Problem 1:

If we write a sequence of consecutive integers starting with 1 to N ($1 < N < 10000$), we can count the number of times each digit appears in the sequence. For example, with $N = 8$, the sequence is: 12345678.

In this sequence, 0 does not appear, 1 appears 1 times, 2 appears 1 time, ..., and finally 8 appears 1 time. Please write a program to report the counting.

Input

The input file consists of several data sets. The first line of the input file contains the number of data sets which is a positive integer and is not bigger than 20. The following lines describe the data sets. For each test case, there is one single line containing the number N .

Output

For each test case, write sequentially in one line the number of digit 0, 1, ..., 9 separated by a space.

Sample Input

```
3
3
3
7
13
```

Sample Output

```
0 1 1 1 0 0 0 0 0 0
0 1 1 1 1 1 1 1 0 0
1 6 2 2 1 1 1 1 1 1
```

Problem 2:

Given a 16-digit XXXX XXXX XXXX XXXX, please follow the steps shown below to check the validity of the given digit.

Step1. Double each digit on odd positions, so the result is a list of 8 numbers.

Step2. Add up the digits of these 8 numbers and 8 undoubled digits.

Step3. If the result is a multiple of 10, then print out “Valid”. Otherwise, print out “Invalid”

For example

Given the digits 2552 7063 1717 3573

In step1. Double the digits: 2, 5, 7, 6, 1, 1, 3, 7. We then obtain 8 numbers: 4, 10, 14, 12, 2, 2, 6, 14

In step2. Add up those digits of 8 numbers and 8 undoubled digits. We get: $4 + (1 + 0) + (1 + 4) + (1 + 2) + 2 + 2 + 6 + (1 + 4) + 5 + 2 + 0 + 3 + 7 + 7 + 5 + 3 = 60$

In step3. The final sum is 60 which is a multiple of 10, so print out “Valid” as the final answer

Input:

The number N in the first line indicates there are N test cases, and each test case contains 16 digits in a line. Every 16 digits is in a group of 4 separated by a whitespace character.

Sample Input

2

2552 7063 1717 3573

2879 4648 8682 2529

Sample Output

Valid

Valid

Problem 3:

Given a permutation of K numbers $1, 2, \dots, K$, and performing the following operation:

- Switch 2 numbers in the adjacent position.

What is the minimal time of performing the operation to make K numbers in increasing order $(1, 2, 3, \dots, K)$?

Input:

The first number N represents there are N testcases followed in the input. Each testcase consists of 2 lines, where the first line denotes a number $K(1 \leq K \leq 50)$ and the second line represents the permutation of $1, 2, \dots, K$.

Sample Input

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

Sample Output

```
1
3
1
```

Problem 4:

In the modern medical system, patients usually need to take medicines on time according to the prescription signed by the doctor. In the prescription, the doctor will tell the patient the type of medicine and the time when each medicine need to be taken. Now according to the prescription provided, please tell the patient the complete medication plan. We will first tell you how many kinds of medicines (variable n) are available and the total number of times you need to take them (variable k). Next, list N kinds of medicines and how often they should be taken each. Finally, please output a complete medication plan based on the input information.

Input

The input file consists of several data sets. The first line of the input file contains the number of data sets which is a positive integer and is not bigger than 15. The following lines describe the data sets.

For each test case, the first line contains the numbers n ($1 \leq n \leq 4 \times 10^3$) and k ($1 \leq k \leq 10^4$), representing the number of types of drugs that must be used and the minimum number of times to take drugs, respectively. The next n lines contain the name of each drug and how often they are taken. ($1 \leq |\text{name}| \leq 15$, $1 \leq \text{frequency} \leq 4 \times 10^3$)

The medicines are ranked according to their degree of importance; in other words, the medicines that appear first are more important.

Output

For each test case, the output must have k lines. Each line contains the name of the medicine and the time when it was taken. If two or more medicines must be taken at the same time, they should be printed according to their priority.

Sample Input

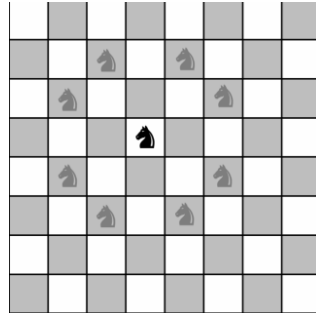
```
1
2 5
Abacavir 20
Piriton 30
```

Sample Output

```
20 Abacavir
30 Piriton
40 Abacavir
60 Abacavir
60 Piriton
```

Problem 5

We have already completed the problem of 8 queens. Now, let the question change a little bit differently. In chess game, the knight is another chess different from the queen. The knight can attack a position two rows and one column away from his position, or a position one row and two columns away from his position, as shown below.



In this question, you need to decide how many knights (maximum number) can be placed on the board (M rows and N columns), so that all knights cannot attack each other. Both M and N will not exceed 500.

Input

Each line consists of an integer pair M and N, ending in a pair of zeros.

Output

For each testcase, output the maximum number of knights that can comply with the rules.

Sample Input

3 4

4 3

3 5

0 0

Sample Output

6

6

8