

## 7367 RATS

The **RATS** (Reverse Add Then Sort) function takes as input a decimal integer (usually with digits in increasing order) and returns a decimal integer with digits in increasing order.

To compute the value:

- 1) Reverse the digits of the input value.
- 2) Add the reversed value to the input value.
- 3) Sort the digits of the sum into increasing order (dropping any leading zeroes).

$$RATS(12334444) : 12334444 + 44443321 = 56777765 \rightarrow 55667777$$

$$RATS(44556) : 44556 + 65544 = 110100 \rightarrow 111$$

This problem deals with sequences where the first value is arbitrary and each succeeding value is the **RATS** of the previous value. For example:

12334444, 55667777, 123334444, 556667777, 1233334444, 5566667777, ...

123, 444, 888, 1677, 3489, 12333, 44556, 111, 222, 444, 888, ...

The first sequence is the **creeper**. It provably goes to infinity in this regular pattern. The second sequence enters a cycle which first repeats a value at the tenth term of the sequence. It is conjectured that every **RATS** sequence either eventually enters the creeper and goes to infinity or cycles as in the second sequence.

Write a program which computes the first  $M$  terms of a **RATS** sequence given the starting value. Your program should also detect if the sequence repeats a value in the first  $M$  terms or enters the creeper in the first  $M$  terms.

### Input

The first line of input contains a single decimal integer  $P$ , ( $1 \leq P \leq 10000$ ), which is the number of data sets that follow. Each data set should be processed identically and independently.

Each data set consists of a single line of input. It contains the data set number,  $K$ , followed by a single space, followed by the number of terms to compute (including the initial value),  $M$ , ( $1 \leq M \leq 60$ ), a single space, followed by the initial value for the **RATS** sequence, a decimal integer with digits in increasing order. The decimal integer will have at most 40 digits although intermediate terms may have more.

### Output

For each data set there is one line of output.

If the sequence enters the *creeper* (has a term of the form  $1233 + 444$  or  $5566 + 7777$ ) in the first  $M$  terms, the output is the data set number, a space, the upper case letter 'C', a space and the index of the first term to enter the *creeper*.

If the sequence repeats a value in the first  $M$  terms, the output is the data set number, a space, the upper case letter 'R', a space and the index of the first repeated term.

Otherwise, the output is the data set number, a space, and the  $M$ -th term of the sequence.

In the first two cases the index of the initial term is 1.

**Sample Input**

```
3
1 30 123
2 30 1
3 30 11233455677899
```

**Sample Output**

```
1 R 10
2 C 20
3 66677888
```