2507 Village People

There is a strange small village in country of East Royal Area Union where people do not tell their ages, but they have generated a collection of hearsay facts of the form "A is older than B by n years" (mathematically expressed $A - B = n$). Since understatement is commonplace in this village, this "fact" actually means that A is older than B by at least n years ($A - B \geq n$).

We are told that folks over the age of m leave the village to find their fortunes elsewhere (i.e., the oldest inhabitant has an age $\leq m$). Bill, the local discrete (but not discreet) mathematician wants to use all these facts to figure out the set of legal combinations of ages: i.e., ones that fit the facts, but he knows at least one person is aged m and people in the village are oldest possible as long as the "facts" are possible. You are to write a program to make Bill's job easier.

As an example, if we suppose there are 5 people in the town, named A, B, C, D and E, the maximum age is 20, and we have the following facts.

A - E $\geq$ 2 (So A is at least 2 years older than E)
E - D $\geq$ 3
D - B $\geq$ 2
A - C $\geq$ 4
C - B $\geq$ 4
C - D $\geq$ 3

The oldest possible ages for people are as follow:

A : 20
B : 11
C : 16
D : 13
E : 18

Input

There will be one or more data sets in the input. The first line of each data set contains three integers: the number of people in the village ($0 < n \leq 26$), the number of facts ($0 \leq f \leq 500$), and the maximum age ($1 \leq m \leq 100$). The values of n and m are completely independent of each other. A data set having n equal to 0 represents the last data set, which should not be processed. The following f lines each contain a fact, encoded in the form 'X`-`Y`>=`Z', where X and Y indicate person X and Y, and Z is a non-negative integer. You may assume the values in the facts refer to people who exist in the village (so if there are just 5 people in the village, the facts will only refer to A, B, C, D, and E).

Output

Each data set should generate a first line like '`Dataset` n`:`' where n is the current data set (starting at 1). Following this should be a list of ages of A, B, C... in the following format:

`A` : $<$ *age of person* $A>$
`B` : $<$ *age of person* $B>$
`C` : $<$ *age of person* $C>$

And so on. (Check the sample output for the format required). If there is no solution or if the facts indicate a negative age for anyone, '`No solution`' should be indicated in the output file and no ages should be given. Have one blank line after each data set.

Sample Input

```
5 0 100
5 6 20
A-E>=2
E-D>=3
D-B>=2
A-C>=4
C-B>=4
C-D>=3
4 2 20
A-B>=10
B-C>=10
4 2 20
A-B>=10
B-C>=11
0 10 20
```

Sample Output

```
Dataset 1:
A : 100
B : 100
C : 100
D : 100
E : 100

Dataset 2:
A : 20
B : 11
C : 16
D : 13
E : 18

Dataset 3:
A : 20
B : 10
C : 0
D : 20

Dataset 4:
No solution
```