



## Problem B

### Box Relations

Input: box.in

There are  $n$  boxes  $C_1, C_2, \dots, C_n$  in 3D space. The edges of the boxes are parallel to the  $x, y$  or  $z$ -axis. We provide some relations of the boxes, and your task is to construct a set of boxes satisfying all these relations.

There are four kinds of relations ( $1 \leq i, j \leq n, i$  is different from  $j$ ):

- I  $i$   $j$ : The intersection volume of  $C_i$  and  $C_j$  is positive.
- X  $i$   $j$ : The intersection volume is zero, and any point inside  $C_i$  has smaller  $x$ -coordinate than any point inside  $C_j$ .
- Y  $i$   $j$ : The intersection volume is zero, and any point inside  $C_i$  has smaller  $y$ -coordinate than any point inside  $C_j$ .
- Z  $i$   $j$ : The intersection volume is zero, and any point inside  $C_i$  has smaller  $z$ -coordinate than any point inside  $C_j$ .

### Input

There will be at most 30 test cases. Each case begins with a line containing two integers  $n$  ( $1 \leq n \leq 1,000$ ) and  $R$  ( $0 \leq R \leq 100,000$ ), the number of boxes and the number of relations. Each of the following  $R$  lines describes a relation, written in the format above. The last test case is followed by  $n=R=0$ , which should not be processed.

### Output

For each test case, print the case number and either the word POSSIBLE or IMPOSSIBLE. If it's possible to construct the set of boxes, the  $i$ -th line of the following  $n$  lines contains six integers  $x_1, y_1, z_1, x_2, y_2, z_2$ , that means the  $i$ -th box is the set of points  $(x, y, z)$  satisfying  $x_1 \leq x \leq x_2, y_1 \leq y \leq y_2, z_1 \leq z \leq z_2$ . The absolute values of  $x_1, y_1, z_1, x_2, y_2, z_2$  should not exceed 1,000,000.

Print a blank line after the output of each test case.

### Sample Input

```
3 2
I 1 2
X 2 3
3 3
Z 1 2
Z 2 3
Z 3 1
1 0
0 0
```

### Output for the Sample Input

```
Case 1: POSSIBLE
0 0 0 2 2 2
1 1 1 3 3 3
8 8 8 9 9 9

Case 2: IMPOSSIBLE

Case 3: POSSIBLE
0 0 0 1 1 1
```