

12229 Box Relations

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
```

Sample Output

```
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