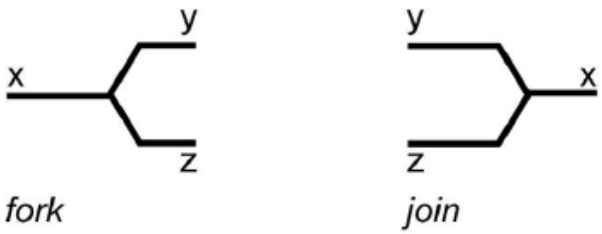
6438 Railroad

For an archipelago like Indonesia, rail transport is not a terribly effective means of transportation, but given the majority of Indonesian population lives in the small Java island (where Jakarta is also in), rail transport is still an attractive solution to connect parts of the island.

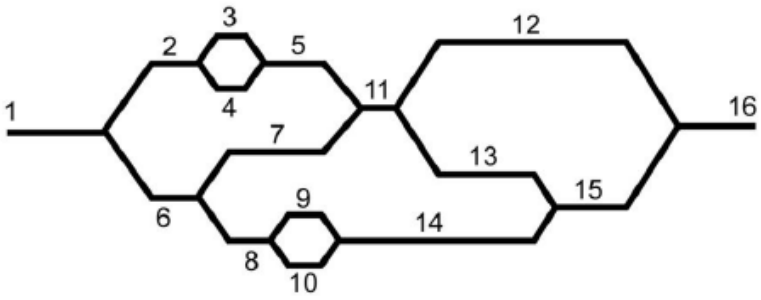
A hypothetical consortium of Java island development proposes a 2030 trans-Java railroad project. It will create a railroad system from the West to the East of Java (for some reasons they are not thinking about the East-to-West rails yet) that starts in Merak (westernmost city of Java) and ends in Banyuwangi (easternmost city of Java).

The rails follow some well-defined patterns. The westernmost segment is numbered 1 and the easternmost segment is numbered N, while all the other segments will be numbered $2 \ldots N-1$. All segments are one-directional — it can only be traveled from the west to the east.

The basic building blocks of the railroad system are forks and joins. A fork (x, y, z) forks the segment x to two segments, y on the north, and z on the south (always in that order). A join (y, z, x) joins the segment y from the north and z from the south to segment x (always in that order).



Thus we can imagine creating certain complex rail system using only these forks and joins, such as in the figure below:



There are no crossings and the Java island for this purpose is guaranteed to be planar.

After the railroad system is built, it now comes the time for quality control. The consortium asks you to create a plan to test the rail segments by running trains through the segments. A train can only move from the west to the east, so multiple train runs may be needed to be able to go through each segment at least once. You're asked to optimize the number of train runs to minimize cost of testing.

Input

The first line contains the number of test cases, T ($1 \leq T \leq 10$). Each case begins with two integers N and K ($4 \leq N \leq 100,000$; $1 \leq K \leq N$) in a line, where N is the number of segments and K is the

number of joins and forks that follow for this case respectively. For the next K lines, each line contains a character ('`F`' or '`J`' indicating fork or join), followed by three segment numbers that define the fork or the join (x y z for forks and y z x for joins). You may assume the given railroad system is valid, that is:

- The rail starts from segment 1 and ends at segment N.
- All segments from 1 to N exist in the railroad system.
- Each segment is a part of at most one fork and one join.

Output

For each case, output '`Case #`X`:` Y', where X is the case number starts from 1 and Y is the number of minimum train runs in order to go through all the segments at least once.

Notes:

- Explanation for 1st sample case

  This sample corresponds to example in the problem statement. At least five trains are needed to test the entire rail segments. Here is an example of the trains' tracks:

  - Train #1: 1, 2, 3, 5, 11, 12 and 16 (starts from segment 1 and then subsequently moves to segment 2, 3, 5, 11, 12 and ends at segment 16).
  - Train #2: 1, 2, 4, 5, 11, 12 and 16.
  - Train #3: 1, 6, 7, 11, 13, 15 and 16.
  - Train #4: 1, 6, 8, 9, 14, 15 and 16.
  - Train #5: 1, 6, 8, 10, 14, 15 and 16.

- Explanation for 2nd sample case At least two trains are needed to test the entire rail segments. Here is an example of the trains' tracks:

  - Train #1: 1, 2, 4, 5 and 7.
  - Train #2: 1, 3, 4, 6 and 7.

Sample Input

```
2
16 10
F 1 2 6
F 2 3 4
J 3 4 5
J 5 7 11
F 6 7 8
F 8 9 10
J 9 10 14
F 11 12 13
J 13 14 15
J 12 15 16
7 4
F 1 2 3
J 2 3 4
F 4 5 6
J 5 6 7
```

Sample Output

```
Case #1: 5
Case #2: 2
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