DFS - Edge Classification

Your task is to classify the edges of a directed graph determined by some dfs graph traversal. In order to have the output unique, we assume the vertices of the input graph are enumerated by $0, \ldots, n-1$, the main dfs loop processes the vertices in order $0, \ldots, n-1$, and the edges of each vertex are processed consistently with the neighbour's numbers (in the increasing order).

Your algorithm should work in time $O(n+m)$, where n and m denote the sizes of the vertex set and of the edge set of the input graph.

Input

The first line contains integer z ($1 \leqslant z \leqslant 2 \cdot 10^9$) – the number of data sets. Each data set is as follows:

The first line contains the numbers n ($1 \leqslant n \leqslant 4000$) and m ($1 \leqslant m \leqslant 20000$) denoting the sizes of the vertex set and of the edge set of the input graph, respectively. Each of the next m lines contains a pair x y denoting the edge directed from x to y.

Output

The type of each edge e of the input graph, where the type is **T**/**F**/**B**/**C** if e is a tree/forward/back/cross edge, respectively. We output the edges $e = (x\ y)$ sorted first by x and then by y.

Example

For the input:

```
1
8 13
0 1
0 2
1 2
1 3
2 4
2 5
3 0
3 5
5 6
6 4
6 5
7 0
7 4
```

the output is:

```
0 1 T
0 2 F
1 2 T
1 3 T
2 4 T
2 5 T
3 0 B
3 5 C
5 6 T
6 4 C
6 5 B
7 0 C
7 4 C
```