

# Bob and Ben



Bob and Ben are playing a game with forests! The game's rules are as follows:

- The game starts with a forest of  $n$  trees.
- Bob always moves first and they take alternating turns. The first player with no available move loses the game.
- During each move, the player removes one node. If the node is *not a leaf*, then the whole tree vanishes; otherwise, the rest of the tree remains in the forest. We define a leaf to be a node with exactly 1 connected edge.
- Both players play optimally, meaning they will not make a move that causes them to lose the game if some better, winning move exists.

We define each tree  $i$  in the  $n$ -tree forest as follows:

- Tree  $i$  is defined by two integers,  $m_i$  (the number of nodes in the tree) and  $k_i$  (a constant).
- Its nodes are numbered sequentially from 1 to  $m_i$ .
- Its edges are numbered sequentially from 1 to  $m_i - 1$ , and each edge  $j$  connects node  $j + 1$  to node  $\lfloor \max(1, \frac{j}{k_i}) \rfloor$ .

Given the values of  $m_i$  and  $k_i$  for each tree in the forest, can you determine who will win the game?

## Input Format

The first line contains an integer,  $g$ , denoting the number of games. The subsequent lines describe each game in the following format:

1. The first line contains an integer,  $n$ , denoting the number of trees in the forest.
2. Each of the  $n$  subsequent lines contains two space-separated integers describing the respective values of  $m_i$  and  $k_i$  for tree  $i$ .

## Constraints

- $1 \leq g \leq 100$
- $1 \leq n \leq 10^6$
- $1 \leq m_i \leq 10^9$
- $2 \leq k_i \leq 100$
- The sum of  $n$  over all games is at most  $10^6$ .

## Subtasks

For 50% of the maximum score:

- The sum of  $n$  over all games is at most  $10^3$ .
- $1 \leq m_i \leq 10^3$

For 25% of the maximum score:

- $1 \leq n, m_i, g \leq 10$

## Output Format

For each game, print the name of the winner on a new line (i.e., BOB or BEN).

Sample Input

```
2
2
1 2
1 3
1
3 2
```

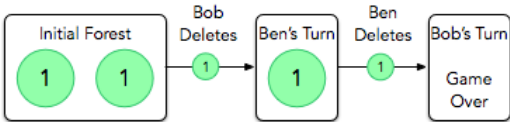
Sample Output

```
BEN
BOB
```

Explanation

Bob and Ben play the following two games:

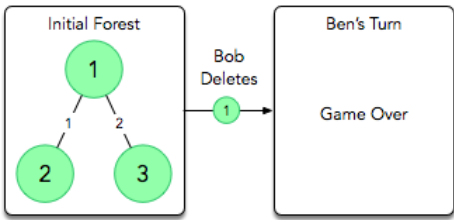
- 1. The forest consists of  $n = 2$  trees containing one node each, and each tree has no edges as  $m_1$  and  $m_2$  are both 1 (so both trees have  $1 - 1 = 0$  edges). The sequence of moves is as follows:



We then print the name of the winner, BEN, on a new line.

- 2. The forest consists of  $n = 1$  tree containing three nodes. We find the  $m_1 - 1 = 2$  edges like so:
  - Edge  $j = 1$  connects node  $j + 1 = 2$  to node  $\text{floor}(\max(1, \frac{j}{k_1})) = \text{floor}(\max(1, \frac{1}{2})) = 1$ .
  - Edge  $j = 2$  connects node  $j + 1 = 3$  to node  $\text{floor}(\max(1, \frac{j}{k_2})) = \text{floor}(\max(1, \frac{2}{2})) = 1$ .

The game then plays out as follows:



We then print the name of the winner, BOB, on a new line.