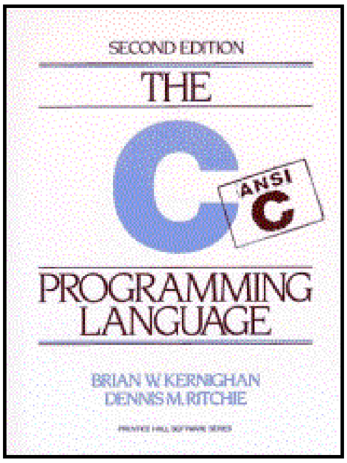
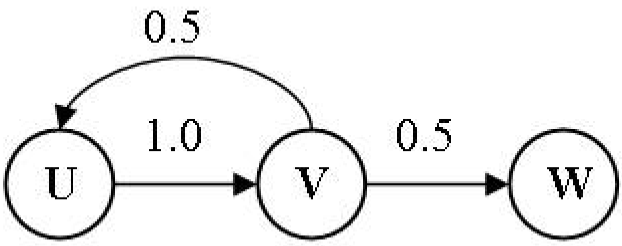
10828 Back to Kernighan-Ritchie



You must have heard the name of **Kernighan** and **Ritchie**, the authors of *The C Programming Language*. While coding in **C**, we use different control statements and loops, such as, *if-then-else*, *for*, *do-while*, etc. Consider the following fragment of pseudo code:

```
//execution starts here
do {
   U;
   V;
} while(condition);
W;
```

In the above code, there is a bias in each conditional branch. Such codes can be represented by control flow graphs like below:



Let the probability of jumping from one node of the graph to any of its adjacent nodes be equal. So, in the above code fragment, the expected number of times U executes is 2. In this problem, you will be given with such a control flow graph and find the expected number of times a node is visited starting from a specific node.

Input

Input consists of several test cases. There will be maximum 100 test cases. Each case starts with an integer: n ($n \leq 100$). Here n is the number of nodes in the graph. Each node in the graph is labeled with 1 to n and execution always starts from 1. Each of the next few lines has two integers: start and end which means execution may jump from node start to node end. A value of zero for start ends this list. After this, there will be an integer q ($q \leq 100$) denoting the number of queries to come. Next q lines contain a node number for which you have to evaluate the expected number of times the node is visited. The last test case has value of zero for n which should not be processed.

Output

Output for each test case should start with '`Case #`i`:`' with next q lines containing the results of the queries in the input with three decimal places. There can be situations where a node will be visited forever (for example, an infinite for loop). In such cases, you should print '`infinity`' (without the quotes). See the sample output section for details of formatting.

Sample Input

```
3
1 2
2 3
2 1
0 0
3
1
2
3
3
1 2
2 3
3 1
0 0
3
3
2
1
0
```

Sample Output

```
Case #1:
2.000
2.000
1.000
Case #2:
infinity
infinity
infinity
```