

## F. Expected diameter of a tree

time limit per test: 3 seconds  
memory limit per test: 256 megabytes  
input: standard input  
output: standard output

Pasha is a good student and one of MoJaK's best friends. He always have a problem to think about. Today they had a talk about the following problem.

We have a forest (acyclic undirected graph) with  $n$  vertices and  $m$  edges. There are  $q$  queries we should answer. In each query two vertices  $v$  and  $u$  are given. Let  $V$  be the set of vertices in the connected component of the graph that contains  $v$ , and  $U$  be the set of vertices in the connected component of the graph that contains  $u$ . Let's add an edge between some vertex and some vertex in and compute the value  $d$  of the resulting component. If the resulting component is a tree, the value  $d$  is the *diameter* of the component, and it is equal to  $-1$  otherwise. What is the expected value of  $d$ , if we choose vertices  $a$  and  $b$  from the sets uniformly at random?

Can you help Pasha to solve this problem?

The *diameter* of the component is the maximum *distance* among some pair of vertices in the component. The *distance* between two vertices is the minimum number of edges on some path between the two vertices.

Note that queries don't add edges to the initial forest.

### Input

The first line contains three integers  $n$ ,  $m$  and  $q$  ( $1 \leq n, m, q \leq 10^5$ ) — the number of vertices, the number of edges in the graph and the number of queries.

Each of the next  $m$  lines contains two integers  $u_i$  and  $v_i$  ( $1 \leq u_i, v_i \leq n$ ), that means there is an edge between vertices  $u_i$  and  $v_i$ .

It is guaranteed that the given graph is a forest.

Each of the next  $q$  lines contains two integers  $u_i$  and  $v_i$  ( $1 \leq u_i, v_i \leq n$ ) — the vertices given in the  $i$ -th query.

### Output

For each query print the expected value of  $d$  as described in the problem statement.

Your answer will be considered correct if its absolute or relative error does not exceed  $10^{-6}$ . Let's assume that your answer is  $a$ , and the jury's answer is  $b$ . The checker program will consider your answer correct, if .

### Examples

input
3 1 2 1 3 3 1 2 3
output
-1 2.0000000000

  

input
5 2 3 2 4 4 3 4 2

4 1
2 5
output
-1
2.6666666667
2.6666666667

### Note

In the first example the vertices 1 and 3 are in the same component, so the answer for the first query is  $-1$ . For the second query there are two options to add the edge: one option is to add the edge 1 - 2, the other one is 2 - 3. In both ways the resulting diameter is 2, so the answer is 2.

In the second example the answer for the first query is obviously  $-1$ . The answer for the second query is the average of three cases: for added edges 1 - 2 or 1 - 3 the diameter is 3, and for added edge 1 - 4 the diameter is 2. Thus, the answer is .