

# A Tree and Two Edges

Problem ID: atreeandtwoedges

Time limit: 3 seconds

Given a connected simple graph (with at most one edge between any pair of nodes) with  $n$  nodes and  $n + 1$  edges (that's a tree with two extra edges), answer a list of queries: for two distinct nodes, how many simple paths are there between them? A simple path is a path that does not repeat nodes.

## Input

The first line of input contains two integers  $n$  ( $4 \leq n \leq 5 \times 10^4$ ) and  $q$  ( $1 \leq q \leq 5 \times 10^4$ ), where  $n$  is the number of nodes and  $q$  is the number of queries. The nodes are numbered from 1 to  $n$ .

Each of the next  $n + 1$  lines contains two integers  $a$  and  $b$  ( $1 \leq a < b \leq n$ ) indicating that there is an edge in the graph between nodes  $a$  and  $b$ . All edges are distinct.

Each of the next  $q$  lines contains two integers  $u$  and  $v$  ( $1 \leq u < v \leq n$ ). This is a query for the number of simple paths between nodes  $u$  and  $v$ .

## Output

Output  $q$  lines. On each line output a single integer, which is the number of simple paths between the query nodes. Output the answers to the queries in the order they appear in the input.

### Sample Input 1

```
4 6
1 2
1 3
1 4
2 3
2 4
1 2
1 3
1 4
2 3
2 4
3 4
```

### Sample Output 1

```
3
3
3
3
3
4
```

### Sample Input 2

```
6 4
1 2
1 3
1 6
2 3
3 4
3 5
4 5
1 2
1 3
1 4
1 6
```

### Sample Output 2

```
2
2
4
1
```