Task: NIE
Amusing journeys

Olimpiada Informatyczna

XXIII OI, Stage III, Day 2. Source file `nie.*` Available memory: 256 MB. *14.04.2016*

Byteasar has discovered the joy of traveling around Bytotia recently. There are n towns (numbered from 1 to n for convenience) in the country, and the Byteotian Railways operate m bidirectional direct train connections between certain pairs of towns. Using those, Byteasar can reach any town in Byteotia, though he may have to change trains.

Our hero has a particular fondness for journeys that start and end in the same city and neither visit any other city nor use any connection more than once. Byteasar calls such journeys *amusing*.

During the latest of his numerous trips, Byteasar has noticed that all his amusing journeys so far used the same number of train connections. He suspects that, rather than a coincidence, this may be a universal property of the railway network in Byteotia, and has asked you to verify this hypothesis. Moreover, should the thesis be true, he would also like to know the number of all possible amusing journeys. For whatever reason, he does not require the exact number of those, but merely its remainder of division by $10^9 + 7$.

A journay can be formally described as a sequence of numbers of successively visited towns. Two journeys of the same length are different if there is an index i such that the i-th towns in the two sequences differ; the length of a journey is the number of train connections it uses.

Input

In the first line of the standard input, there are two integers n and m ($n \geq 1$, $m \geq 0$), separated by a single space, which specify the number of towns and of the train connections in Byteotia respectively. Then m lines follow, describing the train connections. The i-th of these lines contains two integers a_i and b_i ($1 \leq a_i, b_i \leq n$, $a_i \neq b_i$), separated by a single space, which indicate that there is a bidirectional train connection between the towns no. a_i and b_i. There is at most one direct connection linking each pair of towns.

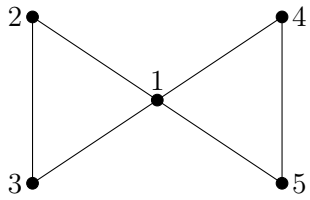
Output

If (unfortunately) there is no amusing journey whatsoever, then the word `BRAK` (Polish for *none*) should be printed to the standard output. If such journeys exist, but they do not all have the same length (refuting Bytesar's hypothesis), then the word `NIE` (Polish for *no*) should be printed to the standard output. Finally, if all the amusing journeys have the same length (i.e., the hypothesis is true), then the word `TAK` (Polish for *yes*) should be printed to the standard output, followed with a new line with two integers separated by a single space: the common length of such journeys and their number modulo $10^9 + 7$.

Example

For the input data:

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



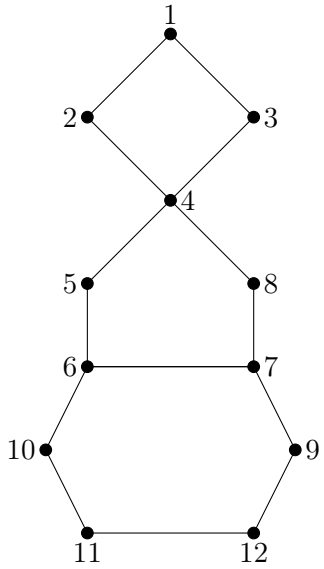
the correct result is:

```
TAK
3 12
```

Explanation of the example: There are 12 amusing journeys, all of which have length 3. These are: 1-2-3-1, 1-3-2-1, 2-1-3-2, 2-3-1-2, 3-1-2-3, 3-2-1-3, 1-4-5-1, 1-5-4-1, 4-1-5-4, 4-5-1-4, 5-1-4-5, 5-4-1-5.

whereas for the following input data:

```
12 14
1 2
2 4
3 1
4 3
4 5
5 6
6 7
7 8
8 4
7 9
9 12
12 11
11 10
10 6
```



the correct answer is:

```
NIE
```

Sample Grading Tests:

`1ocen:` $n = 500\,000$, all towns lie along a path; the answer, clearly, is `BRAK`.

Grading

The set of tests consists of the following subsets. Within each subset, there may be several test groups.

Subset	Property	Score
1	$n \leq 18$	20
2	$n, m \leq 2000$	40
3	$n \leq 500\,000$, $m \leq 1\,000\,000$	40