

Contest Duration: 2018-06-03(Sun) 20:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20180603T2100&p1=248>) ~ 2018-06-03(Sun) 22:10 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20180603T2310&p1=248>) (local time) (130 minutes)

[Back to Home \(/home\)](#)

[🏠 Top \(/contests/agc025\)](#)

[☰ Tasks \(/contests/agc025/tasks\)](#)

[❓ Clarifications \(/contests/agc025/clarifications\)](#) [☰ Results ▾](#)

[⏴ Standings \(/contests/agc025/standings\)](#)

[⏴ Virtual Standings \(/contests/agc025/standings/virtual\)](#)

[📖 Editorial \(/contests/agc025/editorial\)](#)



E - Walking on a Tree

[Editorial \(/contests/agc025/tasks/agc025_e/editorial\)](#)

[🇯🇵](#) / [🇬🇧](#)

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 1500 points

Problem Statement

Takahashi loves walking on a tree. The tree where Takahashi walks has N vertices numbered 1 through N . The i -th of the $N - 1$ edges connects Vertex a_i and Vertex b_i .

Takahashi has scheduled M walks. The i -th walk is done as follows:

- The walk involves two vertices u_i and v_i that are fixed beforehand.
- Takahashi will walk from u_i to v_i or from v_i to u_i along the shortest path.

The *happiness* gained from the i -th walk is defined as follows:

- The happiness gained is the number of the edges traversed during the i -th walk that satisfies one of the following conditions:
 - In the previous walks, the edge has never been traversed.
 - In the previous walks, the edge has only been traversed in the direction opposite to the direction taken in the i -th walk.

Takahashi would like to decide the direction of each walk so that the total happiness gained from the M walks is maximized. Find the maximum total happiness that can be gained, and one specific way to choose the directions of the walks that maximizes the total happiness.

Constraints

- $1 \leq N, M \leq 2000$

2020-09-11 (Fri)
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- $1 \leq a_i, b_i \leq N$
- $1 \leq u_i, v_i \leq N$
- $a_i \neq b_i$
- $u_i \neq v_i$
- The graph given as input is a tree.

Input

Input is given from Standard Input in the following format:

```

N  M
a_1 b_1
:
a_{N-1} b_{N-1}
u_1 v_1
:
u_M v_M

```

Output

Print the maximum total happiness T that can be gained, and one specific way to choose the directions of the walks that maximizes the total happiness, in the following format:

```

T
u^'_1 v^'_1
:
u^'_M v^'_M

```

where $(\boxed{u^'_i}, \boxed{v^'_i})$ is either (u_i, v_i) or (v_i, u_i) , which means that the i -th walk is from vertex $\boxed{u^'_i}$ to $\boxed{v^'_i}$.

Sample Input 1

Copy

```

4 3
2 1
3 1
4 1
2 3
3 4
4 2

```

Copy

Sample Output 1

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

Copy

If we decide the directions of the walks as above, he gains the happiness of 2 in each walk, and the total happiness will be 6.

Sample Input 2

Copy

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

Copy

Sample Output 2

Copy

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

Copy

Sample Input 3

Copy

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

Copy

Sample Output 3

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```
9
2 4
6 3
5 6
4 5
```

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