Black and White Tree

Nikita is making a graph as a birthday gift for her boyfriend, a fellow programmer! She drew an undirected connected graph with N nodes numbered from 1 to N in her notebook.

Each node is shaded in either *white* or *black*. We define n_W to be the number of white nodes, and n_B to be the number of black nodes. The graph is drawn in such a way that:

- No 2 adjacent nodes have same coloring.
- The value of $|n_W - n_B|$, which we'll call D, is minimal.

Nikita's mischievous little brother erased some of the edges and all of the coloring from her graph! As a result, the graph is now decomposed into one or more components. Because you're her best friend, you've decided to help her reconstruct the graph by adding K edges such that the aforementioned graph properties hold true.

Given the decomposed graph, construct and shade a valid connected graph such that the difference $|n_W - n_B|$ between its shaded nodes is minimal.

Input Format

The first line contains 2 space-separated integers, N (the number of nodes in the original graph) and M (the number of edges in the decomposed graph), respectively.
The M subsequent lines each contain 2 space-separated integers, u and v, describing a bidirectional edge between nodes u and v in the decomposed graph.

Constraints

- $1 \le N \le 2 \times 10^5$
- $0 \le M \le min(5 \times 10^5, \frac{N \times (N-1)}{2})$
- It is guaranteed that every edge will be between 2 distinct nodes, and there will never be more than 1 edge between any 2 nodes.
- Your answer *must* meet the following criteria:
  - The graph is connected and no 2 adjacent nodes have the same coloring.
  - The value of $|n_B - n_W|$ is minimal.
  - $K \le 2 \times 10^5$

Output Format

You must have $K + 1$ lines of output. The first line contains 2 space-separated integers: D (the minimum possible value of $|n_B - n_W|$) and K (the number of edges you've added to the graph), respectively.
Each of the K subsequent lines contains 2 space-separated integers, u and v, describing a newly-added bidirectional edge in your final graph (i.e.: new edge $u \leftrightarrow v$).

You may print *any* 1 of the possible reconstructions of Nikita's graph such that the value of D in the reconstructed shaded graph is minimal.

Sample Input 0

```
8 8
1 2
2 3
3 4
4 1
1 5
2 6
3 7
4 8
```

Sample output 0

```
0 0
```

Sample Input 1

```
8 6
1 2
3 4
3 5
3 6
3 7
3 8
```

Sample Output 1

```
4 1
1 5
```

Sample Input 2

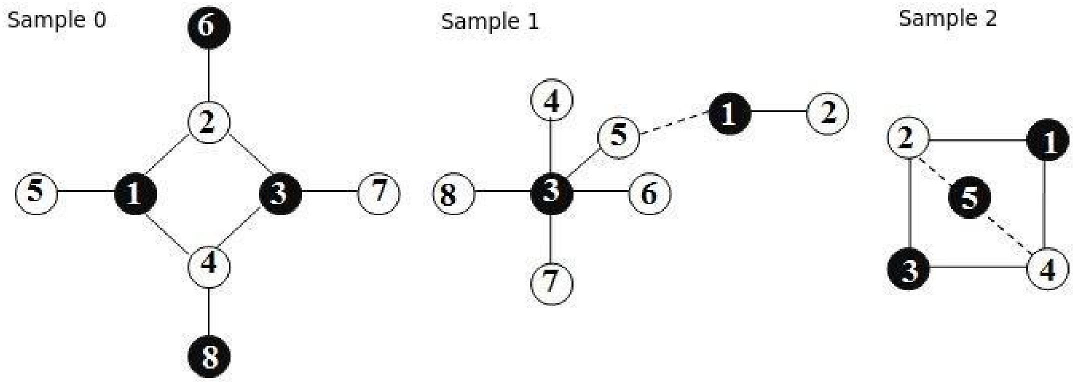
```
5 4
1 2
2 3
3 4
4 1
```

Sample Output 2

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

Explanation

In the figure below, the solid lines show the decomposed graph after Nikita's brother erased the edges, and the dotted lines show one possible correct answer:



In *Sample* 0, no additional edges are added and $K = 0$. Because $n_W = 4$ and $n_B = 4$, we get $|n_W - n_B| = 0$. Thus, we print `0 0` on a new line (there is only 1 line of output, as $K = 0$).

In *Sample* 1, the only edge added is $(5, 1)$, so $K = 1$. Here, $n_W = 6$ and $n_B = 2$, so $|n_W - n_B| = 4$. Thus, we print `4 1` on the first line. Next, we must print K lines describing each edge added; because $K = 1$, we print a single line describing the 2 space-separated nodes connected by our new edge: `1 5`.

In *Sample* 2, we can either add 1 edge $(2, 5)$ or $(4, 5)$, or both of them. In both cases we get $n_W = 2$ and $n_B = 3$, so $|n_W - n_B| = 1$. Thus $D = 1$ and $K = 1$ or 2 both are correct.