Minimum Cuts of 3-Uniform Hypergraphs

Input file:	`standard input`
Output file:	`standard output`
Time limit:	15 seconds
Memory limit:	256 megabytes

You are given a connected undirected 3-uniform hypergraph (with possibly multiple hyperedges between the same triple of vertices). Using an extension of Karger's min-cut algorithm to hypergraphs, find and return the size of the minimum cut (minimum number of hyperedges to remove from the graph so that the graph gets disconnected) in the graph, as well as the number of minimum cuts.

Note that in a 3-uniform connected hypergraph $G = (V, E)$, a minimum cut can result in a partition of V either into two non-empty sets S and $V \setminus S$ or into three non-empty sets S, T, and $V \setminus (S \cup T)$.

Input

The first line of the input contains two space-separated integers n and m ($3 \leq n \leq 100$, $1 \leq m \leq 300$) – the number of vertices and the number of hyperedges, respectively.

The next m lines describe the hyperedges. Each such line contains three space-separated integers a, b, and c ($1 \leq a, b, c \leq n$, $a \neq b$, $b \neq c$, and $c \neq a$) – endpoints of a hyperedge. (The vertices are labeled from 1 to n.) There may be multiple edges between the same pair of vertices. The graph is connected.

Output

Output two integers – the size of the minimum cut and the number of cuts of this size in the graph. Two cuts are different if the corresponding sets of edges are different.

Examples

standard input	standard output
4 2 1 2 3 3 4 1	1 2
9 6 1 2 3 1 9 8 4 5 6 4 3 2 7 8 9 7 6 5	2 15
4 9 1 4 3 4 2 1 2 3 1 1 2 4 2 4 1 1 3 4 1 4 3 4 3 2 4 2 3	6 2

Note

For your probability estimations, you may find it useful to know that there are at most 100 test cases on which your program will be run. You may need to code your algorithm so that, with a reasonable probability (say with probability at least $1 - 10^{-5}$), you pass all the test cases.