Problem C

Bay

Time Limit: 1 Second

We have a grid (lattice) graph $G(n,n)$, where n is the number of vertices along both the x-axis and the y-axis, that is, the number of rows and columns. The vertices of the graph $G(n,n)$ are numbered consecutively from 1 to n^2 in row-major ordering; starting from the top-left vertex, we traverse row by row from top to bottom, and within each row from left to right. Figure 1 shows two examples, $G(5,5)$ and $G(7,7)$ with vertex numbers.

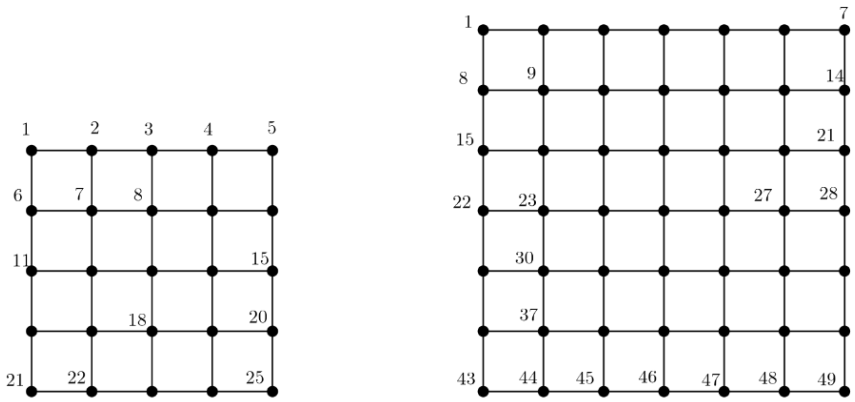

Figure 1. Left: Grid graph $G(5,5)$. Right: $G(7,7)$.

We are given a spanning tree T of $G(n,n)$. The left in Figure 2 shows a spanning tree T of $G(7,7)$. If we add an edge of $G(n,n)$ that does not belong to T (called *non-tree edge*), then exactly one simple cycle is created. We define the region enclosed by this cycle as a *bay*. There is a one-to-one correspondence between non-tree edges and bays, that is, each non-tree edge corresponds to exactly one bay. The area of a bay is defined by number of 1×1 unit cells enclosed by the cycle. The right in Figure 2 shows two bays (colored blue and orange) created by adding two non-tree edges (u,v) and (p,q), respectively. Note that the areas of two bays created by (u,v) and (p,q) are 4 and 12, respectively.

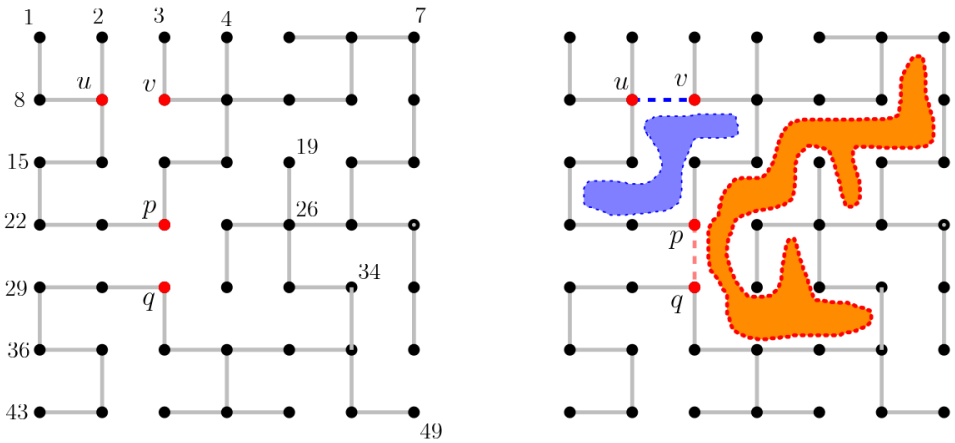

Figure 2. A spanning tree T of a grid $G(7,7)$ and two bays created by (u,v) and (p,q).

Given a spanning tree T of a grid graph $G(n,n)$ and a positive integer S, write a program that finds all non-tree edges that creates bays of area S and outputs the first non-tree edge among them in lexicographical order.

Input

Your program is to read from standard input. The input starts with a line containing two integers n and S where $5 \le n \le 300$ for $G(n,n)$ and $1 \le S \le (n-1)^2$. Each of the following n^2-1 lines contains two distinct integers u and v representing an edge (u,v) of a spanning tree T, where $1 \le u < v \le n^2$.

Output

Your program is to write to standard output. The first line should contain the number of non-tree edges that create the bays of area S. The second line should contain two distinct integers u and v $(u < v)$ representing the first non-tree edge (u,v) in lexicographical order among those that create the bays of area S. The lexicographical order of two edges (a,b) and (c,d) is defined such that (a,b) comes before (c,d) if and only if $a < c$ or, if $a = c$ then $b < d$. If there is no non-tree edge that creates the bay of area S, then print "`0`" in the first line and two zeros "`0 0`" in the second line.

Figure 3 shows two spanning trees of a grid graph with $n = 5$, which are the sample inputs and outputs.

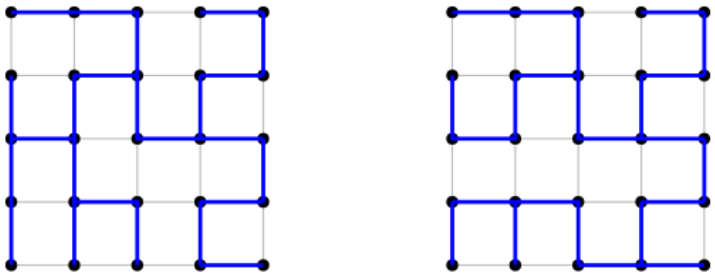

Figure 3. Two spanning trees of $G(5,5)$ for Sample Input 1 and 2.

Sample Input 1	Output for the Sample Input 1	Sample Input 2	Output for the Sample Input 2
5 2 1 2 2 3 3 8 4 5 5 10 6 11 7 8 7 12 8 13 9 10 9 14 11 12 11 16 12 17 13 14 14 15 15 20 16 21 17 18 17 22 18 23 19 20 19 24 24 25	2 13 18	5 2 1 2 2 3 3 8 4 5 5 10 6 11 7 8 7 12 8 13 9 10 9 14 11 12 13 14 14 15 15 20 16 17 16 21 17 18 17 22 18 23 19 20 19 24 23 24 24 25	0 0 0