What a find! Anna Locke has just bought several links of chain some of which may be connected. They are made from zorkium, a material that was frequently used to manufacture jewelry in the last century, but is not used for that purpose anymore. It has its very own shine, incomparable to gold or silver, and impossible to describe to anyone who has not seen it first hand.

Anna wants the pieces joined into a single end-to-end strand of chain. She takes the links to a jeweler who tells her that the cost of joining them depends on the number of chain links that must be opened and closed. In order to minimize the cost, she carefully calculates the minimum number of links that have to be opened to rejoin all the links into a single sequence. This turns out to be more difficult than she at first thought. You must solve this problem for her.

Input

The input consists of descriptions of sets of chain links, one set per line. Each set is a list of integers delimited by one or more spaces. Every description starts with an integer n, which is the number of chain links in the set, where $1 \leq n \leq 15$. We will label the links 1, 2, ..., n. The integers following n describe which links are connected to each other. Every connection is specified by a pair of integers i,j where $1 \leq i, j \leq n$ and $i \neq j$, indicating that chain links i and j are connected, i.e., one passes through the other. The description for each set is terminated by the pair '`-1 -1`', which should not be processed.

The input is terminated by a description starting with n = 0. This description should not be processed and will not contain data for connected links.

Output

For each set of chain links in the input, output a single line which reads

`Set` N`:  Minimum links to open is` M

where N is the set number and M is the minimal number of links that have to be opened and closed such that all links can be joined into one single chain.

Sample Input

```
5 1 2 2 3 4 5 -1 -1
7 1 2 2 3 3 1 4 5 5 6 6 7 7 4 -1 -1
4 1 2 1 3 1 4 -1 -1
3 1 2 2 3 3 1 -1 -1
3 1 2 2 1 -1 -1
0
```

Sample Output

```
Set 1: Minimum links to open is 1
Set 2: Minimum links to open is 2
Set 3: Minimum links to open is 1
Set 4: Minimum links to open is 1
Set 5: Minimum links to open is 1
```