

13th South African Regional ACM Collegiate Programming Contest

Sponsored by IBM

15 October 2011

Problem B - Red Balloon Wormholes

Problem Description

The Bork are back again! This time their dastardly plan to facimilate the human race (sorry, Gene) involves the use of a wormhole transport network. With this wormhole network, the Bork can effortlessly travel from one system to the next, provided that there is a wormhole link connecting the systems.

Fortunately, the captain of the *Unsurprised* is devising an equally cunning 60-minute plan to defeat the Bork. A couple of well-placed gravitron bombs ought to take down the evil Bork's network. If a bomb is detonated in a system, all wormholes connected to that system will collapse. To maximise their chances of success, the captain has to use the smallest number of bombs possible, placing these bombs in the systems that cover the largest number of wormholes.

The dashing commander Datum (a distant, slow cousin of Data), has been tasked with designing a program to calculate the smallest number of bombs required to bring down the Bork wormhole network. Make it so ...

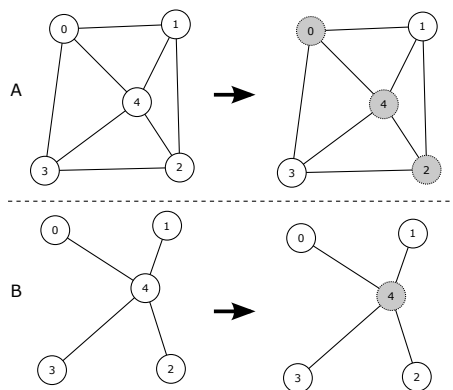


Figure 1: Representations of two wormhole networks. Note that destroying the shaded nodes (on the right) will result in the collapse of all the links between all the nodes.

Input

Your input consists of an arbitrary number of records, each record conforming to the following format:

```

n
k
s1  e1
s2  e2
...  ...
sk  ek

```

where n denotes the number of systems (nodes), and k denotes the number of wormhole links between systems. The next k lines contain the starting system index (s_i) and ending system index (e_i) for each wormhole link.

The number n is in the range 3..20, and k is in the range 2 to $\frac{1}{2}n(n-1)$. The end of input is indicated by a line containing only the value -1 , equivalent to $n == -1$.

Output

For each input record, print out the line

A minimum of c bombs are required

where c denotes the minimum number of bombs required to destroy all the wormhole links.

Sample Input

```

5
4
0 1
1 2
2 3
3 4
5
8
0 1
0 4
1 2
1 4
2 4
2 3
3 0
3 4
-1

```

Sample Output

```
A minimum of 2 bombs are required  
A minimum of 3 bombs are required
```

Time Limit

30 seconds