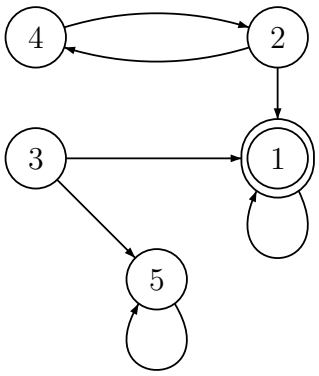
IOI Training Camp 2010 – Test 1, 16 June, 2010

Problem 1 Posh neighbourhoods

The Siruseri Municipal Corporation has drawn up plans to develop Siruseri as a model planned city. The city has been separated into residential zones with roads connecting the zones to each other. Some of the residential zones have shopping centres. Too late, the town planners have discovered that the roads are narrower than they had realised and will all have to be made one-way. In a last minute move, the planning authorities have decided to randomly assign directions to the roads.

This has thrown the entire planning process into disarray. It turns out that not all residential zones are equally convenient to live in. The town planners have classified a residential zone as upmarket if it contains a shopping centre or if it is possible to follow the one-way roads and reach at least one zone containing a shopping centre. Higher up in the value chain are the residential zones classified as posh. A posh residential zone is one from which every residential zone that can be reached is upmarket.

The task is to identify the posh residential zones, given the layout of the residential zones with and without shopping complexes and the orientation of the roads between them.



For example, suppose the neighbourhoods are arranged as shown on the right, where a double circle denotes a residential zone that contains a shopping complex. In this picture, zones 1, 2, 3 and 4 are all upmarket but only zones 1, 2 and 4 are posh. Zone 3 is not posh because it is possible to reach zone 5 from zone 3 and zone 5 is not upmarket.

Input format

The first line of input contains three integers, N, M and R, where N is the number of residential zones, $M \leq N$ is the number of zones with shopping complexes and R is the number of roads. Overall, the zones are numbered

$1, 2, \ldots, N$. Among these, the zones with shopping complex are those numbered $1, 2, \ldots, M$.

This is followed by R lines of input describing the one-way roads. Each line consists of two integers, the starting zone and ending zone of the road.

Output format

A single line with a list of integers, indicating the posh zones. The posh zones should be printed in ascending order.

Test Data

You may assume that $1 \leq N \leq 10^5$ and $1 \leq R \leq 10^6$. In 50% of the test cases, $1 \leq N \leq 3000$.

Sample input

```
5 1 7
4 2
2 4
2 1
1 1
3 1
3 5
5 5
```

Sample output

```
1 2 4
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Time and memory limits

The time limit for this task is 2 seconds. The memory limit is 44 MB (actual limit 32 MB, plus 12 MB buffer for 64-bit compilation).