

[Home](#) » [Compete](#) » [February Lunchtime 2021 Division 3](#) » Independent Set

# Independent Set

Problem Code: INDEP

Submit



Tweet

Read problem statements in [Bengali](#), [Mandarin Chinese](#), [Russian](#), and [Vietnamese](#) as well.

You are given a graph  $G$  with  $N$  vertices (numbered 1 through  $N$ ) and  $M$  edges. You should partition the vertices of  $G$  into two sets  $A$  and  $B$  such that:

- each vertex of  $G$  belongs to exactly one of these sets
- $A$  is non-empty
- $A$  is an independent set in  $G$ , i.e. for each pair of vertices  $u, v \in A$ ,  $G$  does not contain an edge  $(u, v)$
- for each vertex  $a \in A$  and each vertex  $b \in B$ , there is an edge  $(a, b)$  in  $G$

Find the number of such partitions  $(A, B)$ . Also, give an example of one of these partitions or determine that no such partition exists.

Two partitions are considered different if there is a vertex that is in the set  $A$  in one partition and in the set  $B$  in the other partition.

## Input

- The first line of the input contains a single integer  $T$  denoting the number of test cases. The description of  $T$  test cases follows.
- The first line of each test case contains two space-separated integers  $N$  and  $M$ .
- Each of the next  $M$  lines contains two space-separated integers  $u$  and  $v$  denoting that vertices  $u$  and  $v$  are connected by an edge.

## Output

For each test case, print two lines.

- The first of these lines should contain a single integer — the number of partitions satisfying the given conditions.
- The second line should contain a single string with length  $N$ . If there are no partitions satisfying the given conditions, each character of this string should be '0'. Otherwise, this string should describe one such partition — for each valid  $i$ , the  $i$ -th character should be '1' if vertex  $i$  belongs to  $A$  or '0' if it belongs to  $B$ .

## Constraints

- $1 \leq T \leq 5 \cdot 10^5$
- $1 \leq N, M \leq 5 \cdot 10^5$
- $1 \leq u, v \leq N$
- there are no self-loops or duplicate edges in the graph
- the sum of  $N$  over all test cases does not exceed  $5 \cdot 10^5$
- the sum of  $M$  over all test cases does not exceed  $5 \cdot 10^5$

## Subtasks

**Subtask #1 (30 points):**  $N, M, T \leq 100$

**Subtask #2 (70 points):** original constraints

## Example Input

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

### Submission Ends In

17	13
Min	Sec

My Submissions

All Submissions

Successful Submissions



## Example Output

```
1
11000
```

## Explanation

**Example case 1:** The only possible partition satisfying the given conditions is  $A = \{1, 2\}, B = \{3, 4, 5\}$ .

Author: [pshishod2645](#)

Date Added: 25-02-2021

Time Limit: 1 secs

Source Limit: 50000 Bytes

Languages: CPP14, C, JAVA, PYTH 3.6, PYTH, CS2, ADA, PYPY, PYP3, TEXT, CPP17, PAS fpc, RUBY, PHP, NODEJS, GO, TCL, HASK, PERL, SCALA, kotlin, BASH, JS, PAS gpc, BF, LISP sbcl, CLOJ, LUA, D, R, CAML, rust, ASM, FORT, FS, LISP clisp, SQL, swift, SCM guile, PERL6, CLPS, WSPC, ERL, ICK, NICE, PRLG, ICON, PIKE, COB, SCM chicken, SCM qobi, ST, NEM, SQLQ

Submit

Comments ▶

CodeChef is a competitive programming community

[About CodeChef](#) | [Contact Us](#)

The time now is: 10:27:46 PM  
Your IP: 106.66.19.172

CodeChef uses SPOJ © by [Sphere Research Labs](#)

In order to report copyright violations of any kind, send in an email to [copyright@codechef.com](mailto:copyright@codechef.com)

### CodeChef - A Platform for Aspiring Programmers

CodeChef was created as a platform to help programmers make it big in the world of algorithms, computer programming, and programming contests. At CodeChef we work hard to revive the geek in you by hosting a programming contest at the start of the month and two smaller programming challenges at the middle and end of the month. We also aim to have training sessions and discussions related to algorithms, binary search, technicalities like array size and the likes. Apart from providing a platform for programming competitions, CodeChef also has various algorithm tutorials and forum discussions to help those who are new to the world of computer programming.

### Practice Section - A Place to hone your 'Computer Programming Skills'

Try your hand at one of our many practice problems and submit your solution in the language of your choice. Our programming contest judge accepts solutions in over 55+ programming languages. Preparing for coding contests were never this much fun! Receive points, and move up through the CodeChef ranks. Use our practice section to better prepare yourself for the multiple programming challenges that take place through-out the month on CodeChef.

### Compete - Monthly Programming Contests, Cook-off and Lunchtime

Here is where you can show off your computer programming skills. Take part in our 10 days long monthly coding contest and the shorter format Cook-off and Lunchtime coding contests. Put yourself up for recognition and win great prizes. Our programming contests have prizes worth up to INR 20,000 (for Indian Community), \$700 (for Global Community) and lots more CodeChef goodies up for grabs.

#### Programming Tools

[Online IDE](#)

[Upcoming Coding Contests](#)

[Contest Hosting](#)

[Problem Setting](#)

[CodeChef Tutorials](#)

[CodeChef Wiki](#)

#### Practice Problems

[Easy](#)

[Medium](#)

[Hard](#)

[Challenge](#)

[Peer](#)

[School](#)

[FAQ's](#)

#### Initiatives

[Go for Gold](#)

[CodeChef for Schools](#)

[College Chapters](#)

[CodeChef for Business](#)

#### Policy

[Terms of Service](#)

[Privacy Policy](#)

[Refund Policy](#)

[Code of Conduct](#)

[Bug Bounty Program](#)