

Algorithms

CodeForces OJ

Mostafa S. Ibrahim

Teaching, Training and Coaching for more than a decade!

Artificial Intelligence & Computer Vision Researcher

PhD from Simon Fraser University - Canada

Bachelor / Msc from Cairo University - Egypt

Ex-(Software Engineer / ICPC World Finalist)



Codeforces Online judge

- It runs online contests (~2 hours duration).
 - Each contest has 2 divisions
 - Division 1 is for seniors (rating 1900+), Division 2 is for juniors, and there are more
 - Every contestant has a rating (score)
 - Each Division has ~5 sorted problems (easy to hard)
 - Once a contest starts, all problems can be viewed
 - Contestants are split into rooms (~40 per room)
 - You can ask about clarifications during the contest
 - You can later run these contests as Virtual Contests
 - Most important: Style close to ACM ICPC
- English code problems/tutorials of old problems are not so good

Codeforces - Registration

[OpenID](#) or [Gmail](#) account.

Register in Codeforces

Handle

Choose your username (nickname) on Codeforces. Be careful, you will not be able to change it later.

Email

Password

Password should contain at least five characters

Confirm Password

Register

[Re-send Confirmation Email](#) | [Use OpenID](#) | [Use Gmail](#)

Your Profile

ZIAD.MOHAMED BLOG TEAMS SUBMISSIONS GROUPS CONTESTS

Specialist

ziad.mohamed



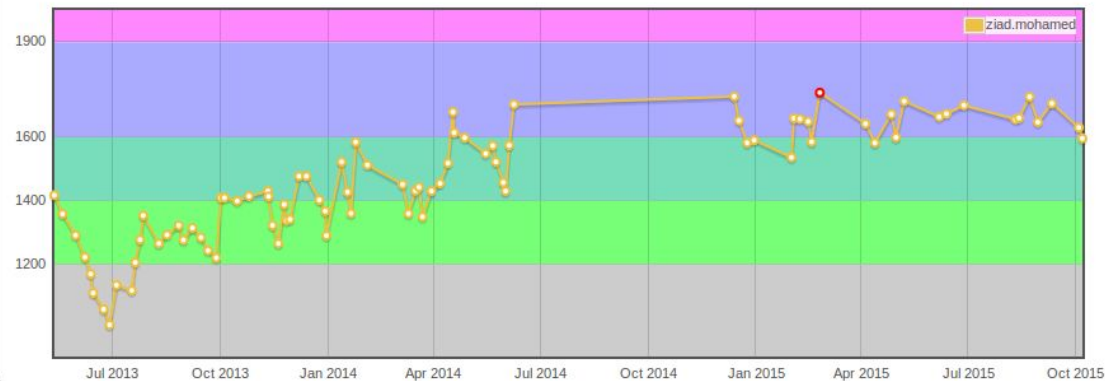
Ziad Mohamed, [Cairo, Egypt](#)
From [FCI-Cairo university](#)




Contest rating **1596** (max. [expert](#) 1740)



Contribution: **+1**



Contests Tab

 **CODEFORCES** β
Sponsored by Telegram

HOME **CONTESTS** GYM PROBLEMSET GROUPS RATING API HELP TESTLIB AIM FUND ROUND 🏆 RCC 🏆 5 YEARS! 🎁

Current or upcoming contests

Name	Writers	Start	Duration	
Codeforces Round #324 (Div. 2)	ZhNV	Oct/06/2015 19:30	02:00	Before start 14:09:36 Register » x1961 Until closing 14:09:36

Contest history

Past contests

Name	Writers	Start	Duration		
Codeforces Round #323 (Div. 1) Enter » Virtual participation »	dans gridnevvvit	Oct/03/2015	02:00	Final standings	x739
Codeforces Round #323 (Div. 2) Enter » Virtual participation »	dans gridnevvvit	Oct/03/2015	02:00	Final standings	x7248
Codeforces Round #322 (Div. 2) Enter » Virtual participation »	fcspartakm homo_sapiens	Sep/28/2015	02:00	Final standings	x5109
Codeforces Round #321 (Div. 2) Enter » Virtual participation »	Vladik igdor99	Sep/22/2015	02:00	Final standings	x6591

Contest: Standings

PROBLEMS | COMMON STANDINGS | **FRIENDS STANDINGS** | RATING CHANGES | FRIENDS RATING CHANGES

☒ show unofficial

Codeforces Round #321 (Div. 2)

Standings	
#	Who
1	ifsmirmov
2	Um_nik
3	sankear#

You may double click into cells (or ctrl+click) to view the submissions history or hack the solution

	=	*	A	B	C	D	E
			750	1250	1500	2000	2500
7646	+5 :-1	744 00:02	1220 00:06	1398 00:17	1904 00:12	1930 00:57	
7025	+3	744 00:02	1195 00:11	1458 00:07	1856 00:18	2070 00:43	
7378		747 00:01	1125 00:05	1452 00:08	1904 00:12	2150 00:30	

PROBLEMS | COMMON STANDINGS | FRIENDS STANDINGS | **RATING CHANGES** | FRIENDS RATING CHANGES

Codeforces Round #315 (Div. 1)

Rating				
#	Who	=	Δ	Rating
1	KAN	3857	+119	2655 → 2774
2	Petr	3564	+24	3103 → 3127
3	enot.1.10	3268	+89	2542 → 2631
4	tonyjw	3026	+100	2449 → 2549
5	HYEA	2869	+117	2358 → 2475

Became **International Grandmaster**

Became **Grandmaster**

Contest - Problemset

[HOME](#) [CONTESTS](#) [GYM](#) [PROBLEMSET](#) [GROUPS](#) [RATING](#) [API](#) [HELP](#) [TESTLIB](#) [AIM FUND ROUND](#) [RCC](#) [5 YEARS!](#)

[PROBLEMS](#) [SUBMIT CODE](#) [MY SUBMISSIONS](#) [STATUS](#) [HACKS](#) [ROOM](#) [STANDINGS](#) [CUSTOM INVOCATION](#)

Problems

#	Name			
A	Asphalting Roads	standard input/output 1 s, 256 MB		x5266
B	Robot's Task	standard input/output 1 s, 256 MB		x4448
C	GCD Table	standard input/output 2 s, 256 MB		x1927
D	Once Again...	standard input/output 1 s, 256 MB		x674
E	Superior Periodic Subarrays	standard input/output 1 s, 256 MB		x44

[Complete problemset](#)

→ Virtual participation

Participants solved the problem in past contest, as close as possible to participation on time. It is supported only ACM-ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

[Start virtual contest](#)

→ Contest materials

- Announcement
- Tutorial

Contest - Problemset - Status

Contest status					
#	When	Who	Problem	Lang	Verdict
13486383	2015-10-08 04:55:30	mehtaharsh199	583B - Robot's Task	Java 8	In queue
13486382	2015-10-08 04:55:26	derekchen	584D - Dima and Lisa	GNU C++11	Running on test 1
13486381	2015-10-08 04:54:58	eduardoibanez	4A - Watermelon	Java 8	Wrong answer on test 5
13486380	2015-10-08 04:54:56	Jleung	468A - 24 Game	Java 8	Wrong answer on test 2
13486379	2015-10-08 04:54:31	misakamicodo	1A - Theatre Square	GNU C++	Accepted

By mostafa.saad.fci, contest: Codeforces Beta Round #1, pr

```
#include <iostream>
#include <cmath>
using namespace std;

int main()
{
    long double n, m, a;
    cin >> n >> m >> a;
    long long rs = ceil(n/a)*ceil(m/a);

    cout << rs << endl;

    return 0;
}
```

Test: #1, time: 0 ms., memory: 4 KB, exit code: 0, i

Input

6 6 4

Output

4

Answer

4

Checker Log

ok 1 number(s): "4"

Test: #2, time: 0 ms., memory: 0 KB, exit code: 0, i

Input

1 1 1

Output

1

Answer

1

Checker Log

ok 1 number(s): "1"

Test: #3, time: 0 ms., memory: 0 KB, exit code: 0, i

Input

2 1 1

Codeforces - Your Solution

- During contests, the solution is judged over a small number of tests called **pretests** (not visible)
 - After the contest, the solution is judged over a **full test set**
 - In **practice**, if the code failed, you can see the test cases
- You can re-submit solutions [Unless locked]
 - However, resubmission => score penalty
 - If it fails on the 1st test case (sample case), NOT considered
 - Penalties only on solved problems.
- You can see other people's submissions
 - After the contest, at any time
 - During the contest, if you locked the problem for **hacking** purposes

Contest - Problem

PROBLEMS SUBMIT CODE MY SUBMISSIONS STATUS HACKS ROOM STANDINGS CUSTOM INVOCATION

A. Asphaltting Roads

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

City X consists of n vertical and n horizontal infinite roads, forming $n \times n$ intersections. Roads (both vertical and horizontal) are numbered from 1 to n , and the intersections are indicated by the numbers of the roads that form them.

Sand roads have long been recognized out of date, so the decision was made to asphalt them. To do this, a team of workers was hired and a schedule of work was made, according to which the intersections should be asphalted.

Road repairs are planned for n^2 days. On the i -th day of the team arrives at the i -th intersection in the list and if **none** of the two roads that form the intersection were already asphalted they asphalt both roads. Otherwise, the team leaves the intersection, without doing anything with the roads.

According to the schedule of road works tell in which days at least one road will be asphalted.

Input

The first line contains integer n ($1 \leq n \leq 50$) — the number of vertical and horizontal roads in the city.

Next n^2 lines contain the order of intersections in the schedule. The i -th of them contains two numbers h_i, v_i ($1 \leq h_i, v_i \leq n$), separated by a space, and meaning that the intersection that goes i -th in the timetable is at the intersection of the h_i -th horizontal and v_i -th vertical roads. It is guaranteed that all the intersections in the timetable are distinct.

Output

In the single line print the numbers of the days when road works will be in progress in ascending order. The days are numbered starting from 1.

Contest - Problem - Right Panel

[→ Submit?](#)

Language:

Choose file: No file selected.

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

[→ Problem tags](#)

No tag edit access

[→ Submit?](#)

Language:

Choose file:

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

[→ Problem tags](#)

No tag edit access

By arnabsamanta, contest: Codeforces Round #321 (Div. 2), problem: (A) Kefa and Park













```
#include <iostream>
int n,m,l,t,pt;
int main(){
    std::cin>>n;
    for(;std::cin>>t;pt=t,(m=(l>m)?l:m))(pt>t)?l=1:l++;
    std::cout<<m;
}
```

All Problem Set Tab

HOME CONTESTS GYM PROBLEMSET GROUPS RATING API HELP TESTLIB AIM FUND ROUND 🏆 RCC 🏆 5 YEARS! 🎁

PROBLEMS SUBMIT STATUS STANDINGS CUSTOM TEST

All problems

#	Name			Solved ▾
1A	Theatre Square	math	 	 x27627
4A	Watermelon	brute force, math	 	 x25506
158A	Next Round	implementation	 	 x18244
71A	Way Too Long Words	strings	 	 x18161

PROBLEMS SUBMIT STATUS STANDINGS CUSTOM TEST

☒ friends only

Users which have submissions in last two weeks are marked with green. Can be cached for several minutes.

Standings

#	Handle	Problems
451	ziad.mohamed	575
453	RedNextYearISA	573

for unsolved problems

Hacking Other People's Solutions

- **Purpose:** Gaining more points by finding other people's wrong submissions
- **Lock** a presolved problem (can't resubmit)
- In your room, view other code..find wrong one
- **Hack** it: Give a test case to show its failure
 - If the code fails => get 100 points. Otherwise, lose 50 points
 - If the code is already hacked, or the owner resubmitted (e.g. hacking old code) => nothing happens
- My hacked solution: 0 pts, resubmit (unless locked), and a test case is added to your pretest.

Practice - Failed Solution?

By mostafa.saad.fci, contest: Codeforces Beta Round #1, problem: (A) Theatre Square, [Wrong answer on test 1, #](#)

```
#include <iostream>
#include <cmath>
using namespace std;

int main()
{
    long long n, m, a;
    cin >> n >> m >> a;
    long long rs = ceil(n/a)*ceil(m/a);

    cout << rs << endl;

    return 0;
}
```

→ Judgement Protocol

Test: #1, time: 30 ms., memory: 0 KB, exit code: 0, checker exit code: 1, verdict: **WRONG ANSWER**

Input

6 6 4

Output

1

Answer

4

Checker Log

wrong answer 1st numbers differ - expected: '4', found: '1'

Practice - Tutorial

Codeforces Round #318 [RussianCodeCup Than

By **Errichto**, 6 weeks ago, , 

Div2B — Bear and Three Musketeers

Warriors are vertices and "knowing each other" is an edge. We want to find cor (and print $sum - 6$ because we don't want to count edges from one chosen ver

Brute force is $O(n^3)$. We iterate over all triples a, b, c and consider them as m know each other). If they are, then we consider sum of their degrees.

We must notice that there is low limit for number of edges. So instead of iteratir then iterate over third vertex. It gives us $O(n^2 + nm)$ and it's intended solution should additionally store edges in 2D adjacency matrix.

It's also possible to write it by adding "if" in right place in brute forces to get $O(n^3)$

Div1A — Bear and Poker

Any positive integer number can be factorized and written as $2^a \cdot 3^b \cdot 5^c \cdot 7^d \cdot \dots$

Colors and Titles

Rating Bounds	Color	Title	Division
2900+	Red	Legendary Grandmaster	1
2600 — 2899	Red	International Grandmaster	1
2400 — 2599	Red	Grandmaster	1
2300 — 2399	Orange	International Master	1
2200 — 2299	Orange	Master	1
1900 — 2199	Violet	Candidate Master	1
1600 — 1899	Blue	Expert	2
1400 — 1599	Cyan	Specialist	2
1200 — 1399	Green	Pupil	2
0 — 1199	Gray	Newbie	2

What else to know?

- Gained Points for a correct submission?
 - X point Problem after M minutes = $X - M(X/250)$ Points
 - a 500 points problem after 10 minutes: $500 - 10 * 2 = 480$ points
 - If you submitted N times, penalty $(N-1)*50$
 - If submitted 3 times after 10 minutes for a 500 problem
 - $480 - (3-1) * 50 = 380$
 - Minimum score is 30% of $X = 150$
- Contest points = \sum problem points + Hacks
- Gym contests: External contests by others
- Can-dos and can't-dos in the contest? in [contest](#)?
- How does the [Rating System](#) works?

“Acquire knowledge and impart it to the people.”

“Seek knowledge from the Cradle to the Grave.”