

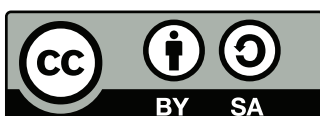
# BAPC 2019 Testsession

*Testsession for the  
2019 Benelux Algorithm Programming Contest*



## Problems

- X Disastrous Doubling
- Y Gamesmanship
- Z Exits in Excess



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# X Disastrous Doubling

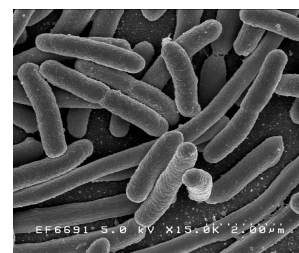
Time limit: 5s

A scientist, E. Collie, is going to do some experiments with bacteria. Right now, she has one bacterium. She already knows that this species of bacteria doubles itself every hour. Hence, after one hour there will be 2 bacteria.

E. Collie will do one experiment every hour, for  $n$  consecutive hours. She starts the first experiment exactly one hour after the first bacterium starts growing. In experiment  $i$  she will need  $b_i$  bacteria.

How many bacteria will be left directly after starting the last experiment? If at any point there are not enough bacteria to do the experiment, print `error`.

Since the answer may be very large, please print it modulo  $10^9 + 7$ .



Picture by Rocky Mountain Laboratories via Wikipedia

## Input

The input consists of two lines.

- The first line contains an integer  $1 \leq n \leq 10^5$ , the number of experiments.
- The second line contains  $n$  integers  $b_1, \dots, b_n$ , where  $0 \leq b_i \leq 2^{20}$  is the number of bacteria used in the  $i$ th experiment.

## Output

- Output a single line containing the number of bacteria that remains after doing all the experiments, or `error`.

### Sample Input 1

3	8
0 0 0	

### Sample Output 1

### Sample Input 2

5	1
1 1 1 1 1	

### Sample Output 2

### Sample Input 3

5	0
0 2 2 4 0	

### Sample Output 3

### Sample Input 4

5	error
0 2 2 4 1	

### Sample Output 4

## Y Gamesmanship

Time limit: 1s

You have been playing video games with your brother the entire day, and he has been beating you mercilessly. However, he has just left to go to the bathroom, so this is your chance! In a show of gamesmanship, you decide to take advantage of your brother's absence. You are currently playing Pong, and the ball (a point) is positioned in the middle of the board at coordinates  $(0,0)$ , moving at an angle of  $\alpha$  degrees from the  $x$ -axis. The ball will be kicked to the right, towards you paddle. Your paddle has  $x$ -coordinate 10. You reckon that you need to hit the ball just once in order to score a point: if need be, you will just move your brother's paddle out of the way.



Picture by mbiebusch via Flickr

You want to know what the  $y$ -coordinate of the ball is once its  $x$ -coordinate equals 10, so that you can move your paddle up or down accordingly.

### Input

- The input consists of a floating number  $-75 < \alpha < 75$ , the angle (in degrees) in which the ball takes off from  $(0,0)$ , measured from the positive  $x$ -axis in counterclockwise direction.

### Output

- Output one floating point number: the  $y$ -coordinate of the ball once its  $x$ -coordinate equals 10. Your answer should have an absolute or relative error of at most  $10^{-6}$ .

#### Sample Input 1

45.0

#### Sample Output 1

10

#### Sample Input 2

-20.0

#### Sample Output 2

-3.6397023427

#### Sample Input 3

3.14159

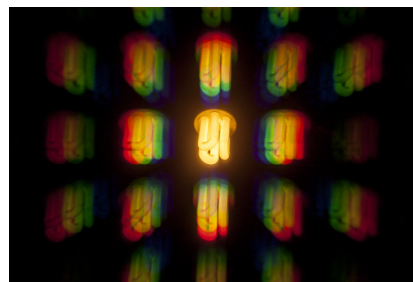
#### Sample Output 3

0.5488610435

## Z Exits in Excess

Time limit: 2s

You own a disco called the Boogie Always Persists Club. The club is famous for its multiple interconnected rooms to twist and shout in. The rooms and the corridors between them form a maze-like structure and for added bonus you have made all the corridors one-way. However, it turns out not everyone is as happy with your club as you are. Recently the fire safety inspectors came by and they were not amused by what they saw: if a fire were to break out in one of the rooms, people would have great difficulty finding the fire exits and might even start running around in circles! They find this completely unacceptable and order you to improve things as quickly as possible. They insist that you have to make sure that no one can run around in circles in the club by removing some of the corridors between the rooms.



Via nikkvalentine on flickr

You, on the other hand, want to retain the attractiveness of the rooms. You do not want to remove too many corridors, because then people will no longer visit your club. You decide that at most half of the corridors may be removed.

Given the layout of the club, remove at most half of the corridors so that no cycles remain.

### Input

- One line containing the number of rooms  $1 \leq n \leq 10^5$  and the number of corridors  $0 \leq m \leq 2 \cdot 10^5$ .
- Then follow  $m$  lines, each containing two different 1-based integers  $u$  and  $v$  indicating a corridor from room  $u$  to room  $v$ . There will be no corridor from a room to itself, nor will there be more than one corridor from one room to any other single room.

### Output

- On the first line, print a single integer  $0 \leq r \leq m/2$ , the number of corridors to be removed.
- Then print  $r$  lines containing the 1-based indices of the corridors that need to be removed to ensure that dancers cannot go around in circles in the disco anymore.

If there are multiple valid solutions, you may output any one of them.

#### Sample Input 1

Sample Input 1	Sample Output 1
2 2	1
1 2	2
2 1	

**Sample Input 2**

3 3	1
1 2	1
2 3	
3 1	

**Sample Output 2****Sample Input 3**

4 5	0
1 2	
1 3	
3 2	
2 4	
3 4	

**Sample Output 3****Sample Input 4**

4 5	2
1 2	4
2 3	5
2 4	
3 1	
4 1	

**Sample Output 4****Sample Input 5**

4 3	1
1 2	2
2 3	
3 4	

**Sample Output 5**

