South Pacific
Competitive
Programming
Association

ICPC SOUTH PACIFIC PRELIMINARY FINALS PRACTICE

SEPTEMBER 14, 2025

Contest Problems

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This contest contains three problems. Good luck.

For problems that state "*Your answer should have an absolute or relative error of less than* 10^{-9}", your answer, x, will be compared to the correct answer, y. If $|x-y| < 10^{-9}$ or $\frac{|x-y|}{|y|} < 10^{-9}$, then your answer will be considered correct.

Definition 1

For problems that ask for a result modulo m:
If the correct answer to the problem is the integer b, then you should display the unique value a such that:

- $0 \le a < m$
  and
- $(a - b)$ is a multiple of m.

Definition 2

A string $s_1 s_2 \cdots s_n$ is lexicographically smaller than $t_1 t_2 \cdots t_\ell$ if

- there exists $k \le \min(n, \ell)$ such that $s_i = t_i$ for all $1 \le i < k$ and $s_k < t_k$
  or
- $s_i = t_i$ for all $1 \le i \le \min(n, \ell)$ and $n < \ell$.

Definition 3

- Uppercase letters are the uppercase English letters ($A, B, \ldots, Z$).
- Lowercase letters are the lowercase English letters ($a, b, \ldots, z$).

Definition 4

Unless otherwise specified, the distance between two points (x_0, y_0) and (x_1, y_1) is defined as its Euclidean distance:

$$\sqrt{(x_0 - x_1)^2 + (y_0 - y_1)^2}.$$

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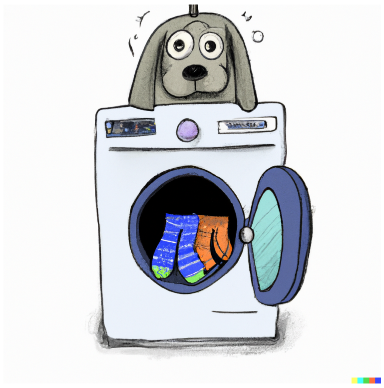
Problem A
Eating Socks
Time limit: 1 second



ARRRGGG! Not again! I swear that every time I put socks into this dryer, some of them go missing!

I have socks with different colours. Any two socks of the same colour can form a pair. I only ever put pairs of socks into the dryer, but when I pull them out of the dryer, I pull out individual socks and need to put them in pairs again.

For example, if I put 3 pairs of green socks (6 green socks) and 1 pair of blue socks (2 blue socks) into the dryer, but only pulled out 2 green socks and 1 blue sock, then 5 socks went missing (4 green and 1 blue).

I do not remember which colours I put into the dryer, or how many socks, but I definitely put them in as pairs only. Given the colours of the socks I pulled out of the dryer, what is the minimum number of socks that are missing?

Input

The first line of input contains a single integer N ($1 \leq N \leq 100$), which is the number of socks pulled out of the dryer.

The next line contains N integers $c_1, c_2, \ldots, c_N$ ($1 \leq c_i \leq 100$), which are the colours of the socks pulled out of the dryer.

Output

Display the minimum number of socks that are missing.

Sample Input 1	Sample Output 1
3 1 2 1	1

Sample Input 2	Sample Output 2
3 1 2 3	3

Sample Input 3	Sample Output 3
6 1 1 1 1 1 1	0

Sample Input 4	Sample Output 4
5 3 14 15 92 65	5

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Problem B

Begrudging Friendship

Time limit: 1 second

Kyle and Leonard have never been the best of friends, but tonight, they are out for a meal together. Kyle has offered to purchase the first round of drinks. All drinks on the menu have different prices.

Kyle would like to order himself a great drink and Leonard a not-so-great drink. But he does not want to be too obvious, so he will not buy himself the most expensive drink and he will not buy Leonard the least expensive drink. He will not buy the same drink for both of them.

If the value of Kyle's drink is k and the value of Leonard's drink is ℓ, then Kyle's *pettiness* value is $k - \ell$. Kyle will choose the two different drinks that maximize the pettiness value without breaking his rule to not buy himself the most expensive drink or buy Leonard the cheapest drink.

Given the prices of all drinks, what is the maximum pettiness value Kyle can achieve?

Input

The first line of input contains a single integer N ($2 \leq N \leq 100$), which is the number of drinks.

The next line contains N distinct integers $d_1, d_2, \ldots, d_N$ ($1 \leq d_i \leq 1\,000\,000$), which are the values of the N drinks.

Output

Display the maximum pettiness value Kyle can achieve.

Sample Input 1	Sample Output 1
4 10 15 5 7	3

Sample Input 2	Sample Output 2
2 10 5	-5

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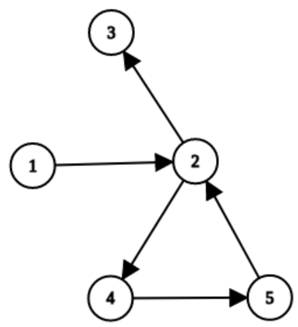
Problem C
Falling Domi ...no, no, NOO!
Time limit: 5 seconds

Pauleen has just about finished her picture made out of dominoes. From above, the dominoes form a beautiful portrait of Iggy the Iguana. Unfortunately for Pauleen, dominoes are not very stable.

When one domino is knocked over, it may knock over several other dominoes, then those dominoes may knock over several other dominoes, and so on. Knocking over a single domino can therefore cause many dominoes to be knocked over. Once a domino is knocked over, it cannot be knocked over again.

Consider the setup in the image. If domino 2 is knocked over, it will knock over dominoes 3 and 4 directly, then domino 4 will knock down domino 5. Domino 1 will not be knocked over.

Pauleen has a mischievous brother who likes to ruin her pictures by knocking over just one domino and watching the ensuing chaos. The *chaos factor* for a domino is the total number of dominoes that are knocked over if the brother chooses to knock over that domino. What is the chaos factor for each of the dominoes?



Input

The first line of input contains two integers D ($2 \leq D \leq 100$), which is the number of dominoes, and R ($1 \leq R \leq D(D-1)$), which is the number of domino relationships. The dominoes are numbered 1 to D.

The next R lines describe the domino relationships. Each of these lines contains two integers x ($1 \leq x \leq D$) and y ($1 \leq y \leq D$ and $x \neq y$), which indicate that if domino x is knocked over, then domino y is directly knocked over as a result. No domino relationship will appear more than once.

Output

Display the chaos factor for each of the dominoes in the order of their numbers.

Sample Input 1	Sample Output 1
5 5 1 2 2 3 2 4 4 5 5 2	5 4 1 4 4

Sample Input 2	Sample Output 2
3 2 1 2 2 3	3 2 1

Sample Input 3	Sample Output 3
2 2 1 2 2 1	2 2

Sample Input 4

```
4 4
1 2
2 3
3 4
4 1
```

Sample Output 4

```
4 4 4 4
```

Sample Input 5

```
4 4
1 2
1 3
2 4
3 4
```

Sample Output 5

```
4 2 2 1
```