G - Balls and Boxes

Editorial (/contests/abc422/tasks/abc422_g/editorial)

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 575 points

Problem Statement

You are given positive integers A, B, C, N.

Solve Problems 1 and 2. (The differences between the problems are indicated in bold.)

Problem 1

There are N balls. **The balls are indistinguishable from each other.** Also, there are boxes 1, 2, and 3.

Find the number, modulo 998244353, of ways to put all balls into the boxes satisfying the following conditions.

- The number of balls in box 1 is a multiple of A.
- The number of balls in box 2 is a multiple of B.
- The number of balls in box 3 is a multiple of C.

Here, two ways of putting balls are counted separately **when there exists a box where the number of balls differs between the two ways**.

Problem 2

There are N balls **numbered from 1 to N. The balls are distinguishable from each other.** Also, there are boxes 1, 2, and 3.
Find the number, modulo 998244353, of ways to put all balls into the boxes satisfying the following conditions.

- The number of balls in box 1 is a multiple of A.
- The number of balls in box 2 is a multiple of B.
- The number of balls in box 3 is a multiple of C.

Here, two ways of putting balls are counted separately **when there exists a ball whose box differs between the two ways**.

Constraints

- $1 \leq N \leq 3 \times 10^5$
- $1 \leq A \leq 3 \times 10^5$
- $1 \leq B \leq 3 \times 10^5$
- $1 \leq C \leq 3 \times 10^5$
- All input values are integers.

Input

The input is given from Standard Input in the following format:

N A B C

Output

Output two lines. On the i-th line, output the answer to Problem i.

Sample Input 1 Copy

```
3 1 2 3
```

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Sample Output 1 Copy

```
3
5
```

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In Problem 1, the ways of putting balls that satisfy the condition are the following three ways:

- Put 3 balls in box 1.
- Put 1 ball in box 1 and 2 balls in box 2.
- Put 3 balls in box 3.

In Problem 2, the ways of putting balls that satisfy the condition are the following five ways:

- Put balls $1, 2, 3$ in box 1.
- Put ball 1 in box 1 and balls $2, 3$ in box 2.
- Put ball 2 in box 1 and balls $1, 3$ in box 2.
- Put ball 3 in box 1 and balls $1, 2$ in box 2.
- Put balls $1, 2, 3$ in box 3.

Sample Input 2 Copy

```
1234 56 7 89
```

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Sample Output 2 Copy

```
15
535248725
```

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Sample Input 3 Copy

```
300000 6 490 420
```

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Sample Output 3 Copy

```
73339
760083042
```

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Sample Input 4 Copy

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12345 67 89 123456
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Sample Output 4 Copy

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```
2
150951502
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