

# A - Two Rectangles

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 100 points

## Problem Statement

There are two rectangles. The lengths of the vertical sides of the first rectangle are  $A$ , and the lengths of the horizontal sides of the first rectangle are  $B$ . The lengths of the vertical sides of the second rectangle are  $C$ , and the lengths of the horizontal sides of the second rectangle are  $D$ .

Print the area of the rectangle with the larger area. If the two rectangles have equal areas, print that area.

## Constraints

- All input values are integers.
- $1 \leq A \leq 10^4$
- $1 \leq B \leq 10^4$
- $1 \leq C \leq 10^4$
- $1 \leq D \leq 10^4$

## Input

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

```
A B C D
```

## Output

Print the area of the rectangle with the larger area. If the two rectangles have equal areas, print that area.

## Sample Input 1

Copy

```
3 5 2 7
```

## Sample Output 1

Copy

```
15
```

The first rectangle has an area of  $3 \times 5 = 15$ , and the second rectangle has an area of  $2 \times 7 = 14$ . Thus, the output should be 15, the larger area.

## Sample Input 2

[Copy](#)

```
100 600 200 300
```

## Sample Output 2

[Copy](#)

```
60000
```

# B - Increment Decrement

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 200 points

## Problem Statement

You have an integer variable  $x$ . Initially,  $x = 0$ .

Some person gave you a string  $S$  of length  $N$ , and using the string you performed the following operation  $N$  times. In the  $i$ -th operation, you incremented the value of  $x$  by 1 if  $S_i = I$ , and decremented the value of  $x$  by 1 if  $S_i = D$ .

Find the maximum value taken by  $x$  during the operations (including before the first operation, and after the last operation).

## Constraints

- $1 \leq N \leq 100$
- $|S| = N$
- No characters except `I` and `D` occur in  $S$ .

## Input

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

```
N  
S
```

## Output

Print the maximum value taken by  $x$  during the operations.

## Sample Input 1

Copy

5

IIDID

## Sample Output 1

Copy

2

After each operation, the value of  $x$  becomes 1, 2, 1, 2 and 1, respectively. Thus, the output should be 2, the maximum value.

## Sample Input 2

Copy

7

DDIDDDII

## Sample Output 2

Copy

0

The initial value  $x = 0$  is the maximum value taken by  $x$ , thus the output should be 0.

# C - Factors of Factorial

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 300 points

## Problem Statement

You are given an integer  $N$ . Find the number of the positive divisors of  $N!$ , modulo  $10^9 + 7$ .

## Constraints

- $1 \leq N \leq 10^3$

## Input

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

$N$

# Output

Print the number of the positive divisors of  $N!$ , modulo  $10^9 + 7$ .

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## Sample Input 1

[Copy](#)

```
3
```

## Sample Output 1

[Copy](#)

```
4
```

There are four divisors of  $3! = 6$ : 1, 2, 3 and 6. Thus, the output should be 4.

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## Sample Input 2

[Copy](#)

```
6
```

## Sample Output 2

[Copy](#)

```
30
```

## Sample Input 3

[Copy](#)

```
1000
```

## Sample Output 3

[Copy](#)

```
972926972
```

# D - Walk and Teleport

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Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 500 points

# Problem Statement

There are  $N$  towns on a line running east-west. The towns are numbered 1 through  $N$ , in order from west to east. Each point on the line has a one-dimensional coordinate, and a point that is farther east has a greater coordinate value. The coordinate of town  $i$  is  $X_i$ .

You are now at town 1, and you want to visit all the other towns. You have two ways to travel:

- Walk on the line. Your *fatigue level* increases by  $A$  each time you travel a distance of 1, regardless of direction.
- Teleport to any location of your choice. Your fatigue level increases by  $B$ , regardless of the distance covered.

Find the minimum possible total increase of your fatigue level when you visit all the towns in these two ways.

## Constraints

- All input values are integers.
- $2 \leq N \leq 10^5$
- $1 \leq X_i \leq 10^9$
- For all  $i$  ( $1 \leq i \leq N - 1$ ),  $X_i < X_{i+1}$ .
- $1 \leq A \leq 10^9$
- $1 \leq B \leq 10^9$

## Input

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

```
N  A  B  
X1  X2  ...  XN
```

## Output

Print the minimum possible total increase of your fatigue level when you visit all the towns.

### Sample Input 1

Copy

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

### Sample Output 1

Copy

```
11
```

From town 1, walk a distance of 1 to town 2, then teleport to town 3, then walk a distance of 2 to town 4. The total increase of your fatigue level in this case is  $2 \times 1 + 5 + 2 \times 2 = 11$ , which is the minimum possible value.

## Sample Input 2

[Copy](#)

```
7 1 100  
40 43 45 105 108 115 124
```

## Sample Output 2

[Copy](#)

```
84
```

From town 1, walk all the way to town 7. The total increase of your fatigue level in this case is 84, which is the minimum possible value.

## Sample Input 3

[Copy](#)

```
7 1 2  
24 35 40 68 72 99 103
```

## Sample Output 3

[Copy](#)

```
12
```

Visit all the towns in any order by teleporting six times. The total increase of your fatigue level in this case is 12, which is the minimum possible value.