

Round B APAC Test 2017

[A. Sherlock and Parentheses](#)

[B. Sherlock and Watson Gym Secrets](#)

C. Watson and Intervals

[D. Sherlock and Permutation Sorting](#)

Questions asked 1

Submissions

Sherlock and Parentheses

4pt Not attempted
3846/5689 users correct (68%)

7pt Not attempted
2912/3801 users correct (77%)

Sherlock and Watson Gym Secrets

6pt Not attempted
1760/3710 users correct (47%)

15pt Not attempted
268/1026 users correct (26%)

Watson and Intervals

8pt Not attempted
526/1376 users correct (38%)

17pt Not attempted
152/284 users correct (54%)

Sherlock and Permutation Sorting

19pt Not attempted
44/428 users correct (10%)

24pt Not attempted
15/27 users correct (56%)

Top Scores

bsbandme	100
alecsyde	100
RiverBlessPeople	100
NAFIS	100
izrak	100
dragon7	100
winoros	100
gvaibhav21	100
stonebuddha	100
VastoLorde95	100

Problem C. Watson and Intervals

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the [Quick-Start Guide](#) to get started.

Small input
8 points

Solve C-small

Large input
17 points

Solve C-large

Problem

Sherlock and Watson have mastered the intricacies of the language C++ in their programming course, so they have moved on to algorithmic problems. In today's class, the tutor introduced the problem of merging one-dimensional intervals. **N** intervals are given, and the *i*th interval is defined by the inclusive endpoints [**L_i**, **R_i**], where **L_i** ≤ **R_i**.

The tutor defined the *covered area* of a set of intervals as the number of integers appearing in at least one of the intervals. (Formally, an integer *p* contributes to the covered area if there is some *j* such that **L_j** ≤ *p* ≤ **R_j**.)

Now, Watson always likes to challenge Sherlock. He has asked Sherlock to remove exactly one interval such that the covered area of the remaining intervals is minimized. Help Sherlock find this minimum possible covered area, after removing exactly one of the **N** intervals.

Input

Each test case consists of one line with eight integers **N**, **L₁**, **R₁**, **A**, **B**, **C₁**, **C₂**, and **M**. **N** is the number of intervals, and the other seven values are parameters that you should use to generate the other intervals, as follows:

First define **x₁** = **L₁** and **y₁** = **R₁**. Then, use the recurrences below to generate **x_i**, **y_i** for *i* = 2 to **N**:

- x_i** = (**A*****x_{i-1}** + **B*****y_{i-1}** + **C₁**) modulo **M**.
- y_i** = (**A*****y_{i-1}** + **B*****x_{i-1}** + **C₂**) modulo **M**.

We define **L_i** = min(**x_i**, **y_i**) and **R_i** = max(**x_i**, **y_i**), for all *i* = 2 to **N**.

Output

For each test case, output one line containing Case #*x*: *y*, where *x* is the test case number (starting from 1) and *y* is the minimum possible covered area of all of the intervals remaining after removing exactly one interval.

Limits

- 1 ≤ **T** ≤ 50.
- 0 ≤ **L₁** ≤ **R₁** ≤ 10⁹.
- 0 ≤ **A** ≤ 10⁹.
- 0 ≤ **B** ≤ 10⁹.
- 0 ≤ **C₁** ≤ 10⁹.
- 0 ≤ **C₂** ≤ 10⁹.
- 1 ≤ **M** ≤ 10⁹.

Small dataset

- 1 ≤ **N** ≤ 1000.

Large dataset

- 1 ≤ **N** ≤ 5 * 10⁵(500000).

Sample

Input	Output
3	Case #1: 0
1 1 1 1 1 1 1	Case #2: 4
3 2 5 1 2 3 4 10	Case #3: 9
4 3 4 3 3 8 10 10	

In case 1, using the generation method, the set of intervals generated are: {[1, 1]}. Removing the only interval, the *covered area* is 0.

In case 2, using the generation method, the set of intervals generated are: {[2, 5], [3, 5], [4, 7]}. Removing the first, second or third interval would cause the covered area of remaining intervals to be 5, 6 and 4, respectively.

In case 3, using the generation method, the set of intervals generated are: {[3, 4], [1, 9], [0, 8], [2, 4]}. Removing the first, second, third or fourth interval would cause the covered area of remaining intervals to be 10, 9, 9 and 10, respectively.

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