

Kickstart Practice Round 2
2017[A. Diwali lightings](#)[B. Safe Squares](#)[C. Beautiful Numbers](#)**[D. Watson and Intervals](#)**[Questions asked](#)

Submissions

Diwali lightings

5pt	Not attempted 89/141 users correct (63%)
8pt	Not attempted 62/87 users correct (71%)

Safe Squares

6pt	Not attempted 55/58 users correct (95%)
13pt	Not attempted 25/53 users correct (47%)

Beautiful Numbers

6pt	Not attempted 51/63 users correct (81%)
15pt	Not attempted 14/39 users correct (36%)

Watson and Intervals

8pt	Not attempted 12/15 users correct (80%)
17pt	Not attempted 7/10 users correct (70%)

Top Scores

Benq	78
1717374	78
yubowenok	78
gridnevvvit	78
LiCode	65
Yash....	53
YourRatzon	53
broncos.billy	53
cmroz	53
sam1373	50

Problem D. 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 D-small

Large input
17 points

Solve D-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 $x_1 = \mathbf{L}_1$ and $y_1 = \mathbf{R}_1$. Then, use the recurrences below to generate x_i , y_i for $i = 2$ to **N**:

- $x_i = (\mathbf{A} * x_{i-1} + \mathbf{B} * y_{i-1} + \mathbf{C}_1) \text{ modulo } \mathbf{M}.$
- $y_i = (\mathbf{A} * y_{i-1} + \mathbf{B} * x_{i-1} + \mathbf{C}_2) \text{ modulo } \mathbf{M}.$

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

- $1 \leq \mathbf{T} \leq 50.$
- $0 \leq \mathbf{L}_1 \leq \mathbf{R}_1 \leq 10^9.$
- $0 \leq \mathbf{A} \leq 10^9.$
- $0 \leq \mathbf{B} \leq 10^9.$
- $0 \leq \mathbf{C}_1 \leq 10^9.$
- $0 \leq \mathbf{C}_2 \leq 10^9.$
- $1 \leq \mathbf{M} \leq 10^9.$

Small dataset

- $1 \leq \mathbf{N} \leq 1000.$

Large dataset

- $1 \leq \mathbf{N} \leq 5 * 10^5 (500000).$

Sample

Input	Output
3	Case #1: 0
1 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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