

homework3.1 The N-th Element

Description

$A[0 \sim N-1]$ and $B[0 \sim N-1]$ are two strictly increasing arrays of N integers each; that is, $A[i] < A[j]$ if $i < j$ and $B[i] < B[j]$ if $i < j$, where $0 \leq i, j \leq N-1$.

Definition of array A: $A[i] = p \cdot i^2 + q \cdot i + r$ (where $p, q, r \leq 10^6$ are positive coefficients)

Definition of array B: $B[i] = x \cdot i^2 + y \cdot i + z$ (where $x, y, z \leq 10^6$ are positive coefficients)

You can assume that all of the numbers can be stored in long long int (64 bits). Your task is to "efficiently" find the N -th smallest element among these two arrays of N integers each (thus a total of $2 \cdot N$ integers).

For example, suppose $p=2, q=2, r=2$, and $x=1, y=2, z=3$, that is, $A[i] = 2 \cdot i^2 + 2 \cdot i + 2$ and $B[i] = 1 \cdot i^2 + 2 \cdot i + 3$

Then given $N=3$: $A[0 \sim 2] = \{2, 6, 14\}$ and $B[0 \sim 2] = \{3, 6, 11\}$

Among these two strictly increasing (sorted) arrays $\{2, 6, 14\}$ and $\{3, 6, 11\}$, the N -th (3rd) smallest element is 6.

Input Format

The first line contains an integer, M ($1 \leq M \leq 100$), which indicates the number of test cases.

Each test case contains three lines: the first line contains three positive integers, p, q, r (i.e., coefficients of array A, separated by spaces), the second line contains three positive integers, x, y, z (i.e., coefficients of array B, separated by spaces), and the third line contains an integer, N ($1 \leq N \leq 10^9$), which is the size of arrays A and B.

Output Format

For each test case, print the N -th smallest element among the two arrays (consisting of a total of $2 \cdot N$ elements). Separate numbers by spaces.

Hint

Sample Input	Sample Output
5 1 2 3 2 2 2 3 1 2 3 2 2 2 4 1 2 3 2 2 2 5 4 3 10 5 6 5 10 2 1 7 10 6 5 10	6 6 11 109 85