LEASTTURN

A N x N maze, each square can be empty or of walls. You're standing at (0, 0) square and want to come to (N-1, N-1) square, rotating at least at possible. In the beginning, you can follow one of four directions, East, West, South, North (this movement is not counted as a rotation). In each step, you can come to a square in front of yourself, or rotate 90 degrees (to the left or right). You mustn't move out of the maze or come into the wall. In order to minimize the data size, the maze is built based on:

1. At first, all of maze's squares are empty.
2. Constructing 2 M-size arrays of integers X and Y according to this formula:
    - $X_0 = X_0 \bmod P$
    - $X_k = (X_{k-1} \text{ x } A+B) \bmod P$ với $1 \le k < M$ (warning: it may overflow)
    - $Y_0 = Y_0 \bmod P$
    - $Y_k = (Y_{k-1} \text{ x } C+D) \bmod P$ với $1 \le k < M$
3. Rules to number squares of walls:
    - With each K, set $a_k = X_k \bmod N$ and $b_k = Y_k \bmod N$.
    - If (a_k, b_k) is not starting or finishing square, tick it as a square of wall. Each square can be ticked a great deal of times.

Input

- A single line containing 9 integers N, X_0, A, B, Y_0, C, D, P, M.
- ($2 \le N \le 500$, $1 \le P \le 1{,}000{,}000$, $0 \le X_0, Y_0, A, B, C, D \le 1{,}000{,}000$)

Output

- Write on a single line the minimum rotating times.
- If unable to come to the finishing point, write -1.

Example

Sample input	Sample output	Description
3 0 1 1 1 1 1 3 3	3	.#. ..# #..
10 911111 845499 866249 688029 742197 312197 384409 40	12	pp##..#..# #pp..###.. .#p#.....# ##p...#.#. .#p.##.#.. ##p##.#... #pp####... pp#.#...#. p#pppp#... ppp##ppppp