

Block

2024/2025 SEASON – THIRD ROUND



Rosen signed up for the tournament of the ancient game “Block”. It is played on a square matrix $N*N$. On each turn the player receives 1 of the 5 possible blocks:

- Block 0:
- Block 1:
- Block 2:
- Block 3:
- Block 4:

Every block consists of a few squares, each covering 1 cell in the matrix. The lighter colored square is special and is used for defining the position of a move (this will be explained later). Every block that you receive is rotated by 0, 90, 180 or 270 degrees clockwise (the special square rotates as well). The goal of the player is to put the block somewhere in the matrix so that all of its squares cover non-occupied cells in the matrix. If 1) the block cannot be placed on any free cells; 2) the player gives up or 3) the time runs out, the game ends and the player's score is the count of moves until now.

Since the players constantly fill cells in the matrix with blocks, there is a special rule which frees cells. In the end of every move, the committee checks every row and every column in the table. If a row or a column is completely covered, all of its cells are emptied. The clearing is done simultaneously on all rows and columns, i.e. it is possible for a cell to be cleared both from its row or its column.

The game has a long history and initially, there were not any computers to generate random blocks and random rotations. Thus, the committee has calculated a way to generate this data by themselves. This information is classified, but Rosen managed to get his hands on it. The committee chooses 6 integers: a, b, c, d, e, f. Before each turn the following operations are performed:

- $c = (c \text{ XOR } a) + b$
- $f = (f \text{ XOR } d) + e$

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After that the block's index is $c \bmod 5$, while its rotation is $f \bmod 4$. The rotation is $90 * (f \bmod 4)$ degrees.

Rosen really wants to win the competition, but currently all competitors are on a cleansing ritual. Before the start he manages to tell you N , a , b , c , d , e and f and your task is to write a program that returns a sequence of moves which is as long as possible.

Input

The first line of the file **block.in** reads N , a , b , c , d , e and f – the size of the table and the 6 integers, determining the random blocks and their rotations.

Output

On the first line of the file **block.out** print a number M – the count of valid moves you found. Each of the next M lines should consist of 2 integers x_i, y_i : the position of your special square. The rows and columns are numbered from 1 to N in a left-to-right fashion and from top-to-bottom.

Scoring

If 1) you place a block that is partially or completely outside of the matrix; or 2) you place a block, which overlaps with a covered cell, you will receive a message "Error" and 0 points for the corresponding test. Otherwise:

Let $maxScore$ be the longest sequence of moves among all participants. You will receive $(\frac{M+1}{maxScore+1})$ multiplied by the points for this test.

Constraints

$$1 \leq N \leq 25$$

$$0 \leq a, b, c, d, e, f \leq 10^9$$

Time Limit: 5 sec.

Memory Limit: 256 MB.

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Test Spread:

N	Test percentage
N = 8	25%
N = 16	25%
N = 20	25%
N = 25	25%

Sample test

Input (block.in)	Output (block.out)
8 33 11 17 77 26 10	9 7 1 7 4 2 7 3 6 5 7 6 5 8 7 1 1 4 7

Explanation for the sample test

The diagrams represent the states of the table after every move from Rosen and the following committee clearance:

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1.

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

 =>

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

2.

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

 =>

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

3.

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

 =>

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

4.

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

 =>

	1	2	3	4	5	6	7	8
1								
2								
3								
4								
5								
6								
7								
8								

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5.

	1	2	3	4	5	6	7	8
1							■	■
2							■	■
3						■	■	■
4						■	■	■
5							■	■
6		■						
7	■	■	■	■	■	■		
8				■				

 =>

	1	2	3	4	5	6	7	8
1							■	■
2							■	■
3						■	■	■
4						■	■	■
5							■	■
6		■						
7	■	■	■	■	■	■		
8				■				

6.

	1	2	3	4	5	6	7	8
1							■	■
2							■	■
3						■	■	■
4						■	■	■
5							■	■
6		■			■	■	■	■
7	■	■	■	■	■	■		
8				■				

 =>

	1	2	3	4	5	6	7	8
1							■	■
2							■	■
3						■	■	■
4						■	■	■
5							■	■
6		■			■	■	■	■
7	■	■	■	■	■	■		
8				■				

7.

	1	2	3	4	5	6	7	8
1							■	■
2							■	■
3						■	■	■
4						■	■	■
5							■	■
6		■			■	■	■	■
7	■	■	■	■	■	■		
8				■			■	■

 =>

	1	2	3	4	5	6	7	8
1								
2								
3						■		
4						■		
5								
6		■			■	■		
7								
8				■				

8.

	1	2	3	4	5	6	7	8
1	■	■	■	■				
2								
3						■		
4						■		
5								
6		■			■	■		
7								
8				■				

 =>

	1	2	3	4	5	6	7	8
1	■	■	■	■				
2								
3						■		
4						■		
5								
6		■			■	■		
7								
8				■				

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9.

	1	2	3	4	5	6	7	8
1	■	■	■	■				
2								
3						■	■	
4						■	■	■
5								
6		■			■	■		
7								
8				■				

=>

	1	2	3	4	5	6	7	8
1	■	■	■	■				
2								
3						■	■	
4						■	■	■
5								
6		■			■	■		
7								
8				■				

Rosen gives up and finishes the game with 9 moves. His score is 9.