6842 L_∞ Jumps

Given two points (p, q) and (p', q') in the XY-plane, the L_∞ *distance* between them is defined as $\max(|p - p'|, |q - q'|)$. In this problem, you are given four integers n, d, s, t. Suppose that you are initially standing at point (0, 0) and you need to move to point (s, t). For this purpose, you perform jumps exactly n times. In each jump, you must move exactly d in the L_∞ distance measure. In addition, the point you reach by a jump must be a lattice point in the XY-plane. That is, when you are standing at point (p, q), you can move to a new point (p', q') by a single jump if p' and q' are integers and $\max(|p - p'|, |q - q'|) = d$ holds.

Note that you cannot stop jumping even if you reach the destination point (s, t) before you perform the jumps n times.

To make the problem more interesting, suppose that some cost occurs for each jump. You are given $2n$ additional integers x_1, y_1, x_2, y_2, ..., x_n, y_n such that $\max(|x_i|, |y_i|) = d$ holds for each $1 \leq i \leq n$. The cost of the i-th (1-indexed) jump is defined as follows: Let (p, q) be a point at which you are standing before the i-th jump. Consider a set of lattice points that you can jump to. Note that this set consists of all the lattice points on the edge of a certain square. We assign integer 1 to point $(p + x_i, q + y_i)$. Then, we assign integers 2, 3, ..., $8d$ to the remaining points in the set in the counter-clockwise order. (Here, assume that the right direction is positive in the x-axis and the upper direction is positive in the y-axis.) These integers represent the costs when you perform a jump to these points.

For example, Figure K.1 illustrates the points reachable by your i-th jump when $d = 2$ and you are at (3, 1). The numbers represent the costs for $x_i = -1$ and $y_i = -2$.

Compute and output the minimum required sum of the costs for the objective.

Input

The input file contains several test cases, each of them with the following format.

n d s t
x_1 y_1
x_2 y_2
⋮
x_n y_n

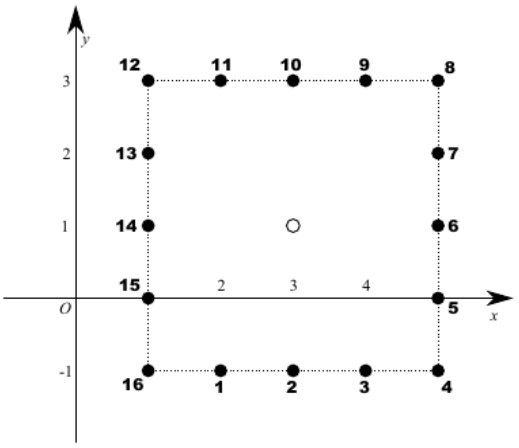

Figure K.1. Reachable points and their costs

The first line contains four integers. n ($1 \leq n \leq 40$) is the number of jumps to perform. d ($1 \leq d \leq 10^{10}$) is the L_∞ distance which you must move by a single jump. s and t ($|s|, |t| \leq nd$) are the x and y coordinates of the destination point. It is guaranteed that there is at least one way to reach the destination point by performing n jumps.

Each of the following n lines contains two integers, x_i and y_i with $\max(|x_i|, |y_i|) = d$.

Output

For each test case, output the minimum required cost to reach the destination point.

Sample Input

```
3 2 4 0
2 2
-2 -2
-2 2
4 1 2 -2
1 -1
1 0
1 1
-1 0
6 5 0 2
5 2
-5 2
5 0
-3 5
-5 4
5 5
5 91 -218 -351
91 91
91 91
91 91
91 91
91 91
1 10000000000 -10000000000 -2527532346
8198855077 10000000000
```

Sample Output

```
15
10
24
1958
30726387424
```