

Problem C – Passagem de Barcos à Vela

The city of Porto is investing in renovating its riverside area. The city council is funding the construction of a bridge-shaped sculpture that connects the two riverbanks. The artist designed the sculpture using only straight segments that are either parallel or perpendicular to the river's waterline. Every year Porto hosts a sailing regatta, so the council wants to know in how many distinct ways boats can sail underneath the sculpture.

A boat is represented by an acute trapezoid, identified by four integers \boldsymbol{w} , \boldsymbol{h} , \boldsymbol{a} and \boldsymbol{b} . The lower base of the trapezoid has length \boldsymbol{w} , its upper base has length $\boldsymbol{w} - \boldsymbol{a} - \boldsymbol{b}$, and its height is \boldsymbol{h} . It is guaranteed that either $\boldsymbol{a} = 0$ or $\boldsymbol{h}/\boldsymbol{a}$ is an integer, and either $\boldsymbol{b} = 0$ or $\boldsymbol{h}/\boldsymbol{b}$ is an integer.



The diagram below illustrates an example with $\boldsymbol{w} = 4$, $\boldsymbol{h} = 4$, $\boldsymbol{a} = 1$ and $\boldsymbol{b} = 2$:



The bridge is specified by a poly-line profile: two arrays of N integers dx[1..N] and dy[1..N] are given. For each segment i (numbered 0 to N - 1) they store the coordinate differences between its endpoints:

- If segment *i* is horizontal, then dy[i] = 0 and dx[i] is its horizontal length (positive or negative).
- If segment *i* is vertical, then dx[i] = 0 and dy[i] is its vertical length (positive or negative).

It is guaranteed that no two consecutive segments are vertical and that the cumulative displacements take the poly-line from (0,0) to $(\mathbf{W}, 0)$.

For example, with W = 6, N = 7, dx = [0, 4, 0, -3, 0, 5, 0] and dy = [3, 0, 2, 0, -1, 0, -4], the bridge looks like this:



A boat can pass beneath the bridge at the integer position \boldsymbol{x} if all of the following hold:

- All four vertices of the trapezoid have integer coordinates.
- The trapezoid's lower base of length \boldsymbol{w} lies on the x-axis (the water level).
- The bridge does not intersect the interior of the trapezoid (touching the boundary is allowed).

Given the bridge shape (dx and dy) and the sail parameters h, w, a and b, determine how many integer positions x allow the boat to pass under the bridge.

Constraints

The following limits apply to every test case:

$1 \leq T \leq 10$	Number of test cases
$1 \leq N \leq 10^5$	Number of segments
$1 \leq \boldsymbol{w} \leq \boldsymbol{W} \leq 10^5$	Total width and sail width
$1 \le \mathbf{h} \le 10^9$	Sail height
$-10^5 \le dx[i], \ dy[i] \le 10^5$	Segment lengths

In addition, it is guaranteed that:

• For every i, exactly one of dx[i] or dy[i] is non-zero, so each segment is non-degenerate and either vertical or horizontal.

- For every *i*, if $dy[i] \neq 0$ then dy[i+1] = 0; that is, two vertical segments never appear consecutively.
- $0 \leq \boldsymbol{a}, \boldsymbol{b}$ and $\boldsymbol{a} + \boldsymbol{b} \leq \boldsymbol{w}$.
- $\boldsymbol{a} = 0$ or $\boldsymbol{h}/\boldsymbol{a}$ is an integer; $\boldsymbol{b} = 0$ or $\boldsymbol{h}/\boldsymbol{b}$ is an integer.
- Every point of the bridge has x-coordinate between 0 and W and y-coordinate between 0 and 10^9 .

Subtask overview

The test cases are divided into seven groups with additional restrictions:

Group	Points	Additional Constraints
1	10	$N, W \leq 100$ and bridge height ≤ 100 .
2	15	$dx[i] \ge 0$ and $a = b = 0$ (the sail is a rectangle)
3	15	$dx[i] \ge 0$ and $a = w, b = 0$ (the sail is a right triangle)
4	15	$dx[i] \ge 0$
5	15	$\boldsymbol{a} = \boldsymbol{b} = 0$ (the sail is a rectangle)
6	15	$\boldsymbol{a} = \boldsymbol{w}, \boldsymbol{b} = 0$ (the sail is a right triangle)
7	15	No additional restrictions

Input Format

The first line contains an integer T, the number of test cases. Each test case consists of four lines:

- One line with two integers W and N.
- One line with N integers, forming the array dx[0..N-1].
- One line with N integers, forming the array dy[0..N-1].
- One line with four integers h, w, a and b.

Output Format

Output a single integer: the number of integer positions x at which the boat with the given sail can pass under the bridge.

Example 1 Input

Example 1 Output

1 0 2

Example 1 Description

The following images correspond to the three sample cases:









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