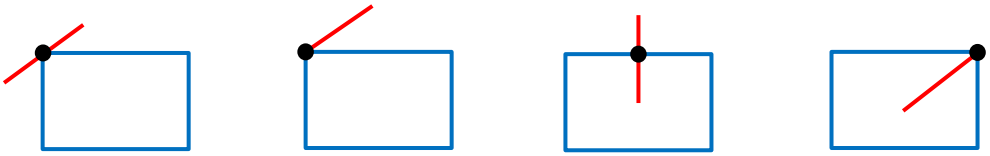
The 39th Annual ACM
International Collegiate Programming Contest
Asia Regional – Daejeon
Korea Nationwide Internet Competition

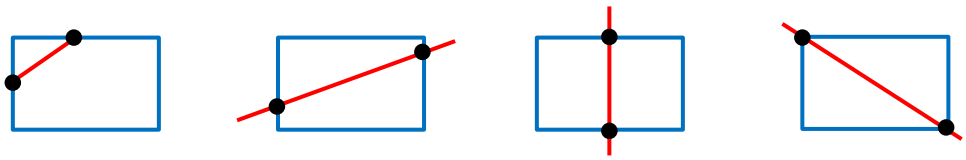
Problem F
Intersections
Time Limit: 1 Second

Your job is to write a program of solving a simple geometry problem for finding the number of intersection points of the boundary of a rectangle and a line segment. Each edge of a given rectangle is parallel to *x*-axis or *y*-axis. (*You are very lucky*!) The number of intersections between them is zero, one, two, or infinity. A case of 'infinity' occurs in a situation in which an edge of the rectangle and the segment are overlapped partially or wholly. See the figure below which shows examples of several situations between a rectangle and a segment.

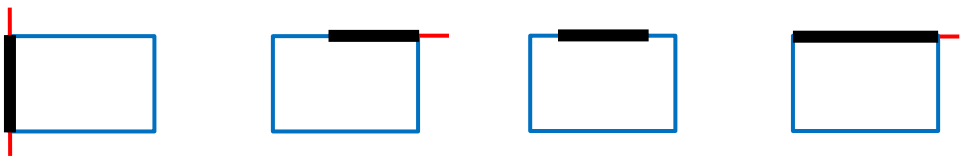
(a) Some examples of zero intersection between R and l.



(b) Some examples of one intersection between R and l.



(c) Some examples of two intersections between R and l.



(d) Some examples of infinite intersections between R and l.

Figure 1. Examples of several situations between a rectangle R(blue) and a line segment l(red).

Input
Input file name is '`intersection.inp`'. The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case starts with four integers $xmin$, $ymin$, $xmax$, and $ymax$ representing a rectangle R, where ($xmin$, $ymin$) and ($xmax$, $ymax$) represent the coordinates of the lower

left corner and upper right corner of R, respectively, $-10{,}000 \leq xmin < xmax \leq 10{,}000$ and $-10{,}000 \leq ymin < ymax \leq 10{,}000$. The next line contains four integers x_1, y_1, x_2, and y_2 representing a line segment l, where (x_1, y_1) and (x_2, y_2) represent the coordinates of two end points of l, respectively, $-10{,}000 \leq x_1, y_1, x_2, y_2 \leq 10{,}000$, and the length of l is greater than zero.

Output

Output file name is '`intersection.out`'. Print exactly one line for each test case. The line should contain an integer representing the number of the intersections of the boundary of a rectangle and a line segment given by input. If the number of the intersections is infinity, then your program should output "4" instead.

The following shows sample input and output for sixteen test cases.

Sample Input	Output for the Sample Input
16 0 0 8 4 2 6 -2 3 0 0 8 4 0 4 9 4 0 0 8 4 3 5 6 6 0 0 8 4 -2 5 10 -1 0 0 8 4 0 5 8 5 0 0 8 4 4 3 4 1 0 0 8 4 -2 3 2 5 0 0 8 4 2 4 6 4 0 0 8 4 0 4 4 7 0 0 8 4 4 2 4 4 0 0 8 4 4 2 8 4 0 0 8 4 0 2 3 4 0 0 8 4 -4 0 12 4 0 0 8 4 4 8 4 -1 0 0 8 4 0 -2 0 6 0 0 8 4 3 4 10 4	0 4 0 2 0 0 1 4 1 1 1 2 2 2 4 4