B: Home alone: Johnny lost in New York

Memory limit: **128 MB**

Johnny has just arrived in New York for a conference. He slept in the plane and now has a whole day free. He wants to go sightseeing, but in the evening he has to be on time for the conference. Johnny is well prepared – he knows that the streets of New York form a regular grid, and points of interest are at every crossing! Johnny wonders if it is possible to make a trip from the hotel at crossing s to the conference place at crossing t while visiting every crossing exactly once – he doesn't want to waste any time. Of course he visits crossing s just after leaving the hotel, even before the trip starts.

The streets of New York form a regular grid: on the map there are n vertical streets and m horizontal streets. The street names are just numbers: vertical streets are numbered from the left side, while horizontal streets are numbered from the up side, both types are numbered with consecutive integers starting with 1. Each horizontal street crosses with every vertical street, and the crossing of x^{th} vertical and y^{th} horizontal street is denoted as (x, y).

Input

The input consists of three lines, each of which contains two integers separated by single spaces. In the first line there are n and m ($4 \le n, m \le 1000$), denoting respectively the number of vertical and horizontal streets on the map. In the second line there are s_x and s_y ($1 \le s_x \le n$ and $1 \le s_y \le m$). In the third line there are t_x and t_y ($1 \le t_x \le n$ and $1 \le t_y \le m$). The hotel is at the crossing (s_x, s_y), while the conference place is at the crossing (t_x, t_y). Crossings s and t are different.

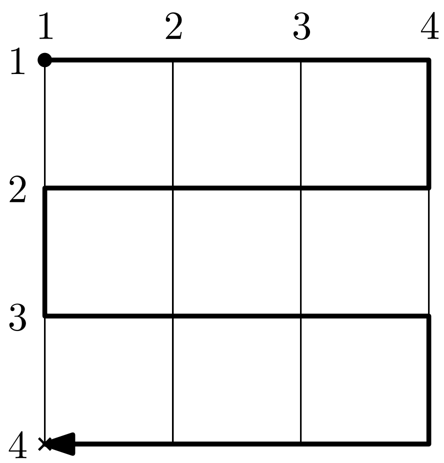
Output

The output should consist of a single line and contain the description of a trip that Johnny could take, or the word `NIE` if it's not possible to make a trip satisfying above conditions. The description should consist of a string of $n \cdot m - 1$ letters `D`, `G`, `L`, or `P`, which mean that the next step of Johnny's trip should be to go to the nearest crossing in the direction down, up, left, or right respectively (here up, down, left, and right are the directions on the map that Johnny has).

Example

Input	Output
4 4 1 1 1 4	PPPDLLLDPPPDLLL

The diagram shows an example trip that Johnny could take. The hotel is marked with a dot, while the conference place is marked with a cross.



Input	Output
4 4 3 2 2 3	NIE

The hotel is marked with a dot, while the conference place is marked with a cross. It's not possible to make a trip that would go through every crossing exactly once.