Movement Directions

You are given $n+1$ points A_0, A_1, ..., A_n in the plane. First, you are asked to move from A_0 to A_1. Next, you will move through A_2, A_3, ..., A_n along the line segments.

Compute the directions you will need to turn by and the values of the cosine of the turning angle for each of the points A_1, A_2, ..., A_{n-1}.

Input data specification

In the first line, you are given one number $2<=n<=1000$, and in the each of the following $n+1$ lines, two integers:
$-1000 <= x_i\ y_i <= 1000$ - the coordinates of the subsequent points.

You can assume that any two consecutive points are different.

Output data specification

In $n-1$ consecutive lines, first print one letter L (if you are turning left) or R (if you are turning right), followed by a space and the value of the cosine of the turning angle with 6 digits' precision. If you do not turn at all but go forward at a particular point, please print just a letter F instead. Also, if you turn around and move back in the opposite direction, print only a letter B.

Example 1

Input:
5
0 0
1 0
2 0
-2 0
-2 -2
0 4

Output:
F
B
L 0.000000
L -0.948683

Scoring

By solving this problem you score 10 points.