

C. Bulb and Pipes

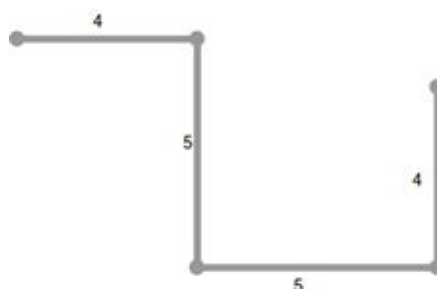
Score: 1

CPU: 2s

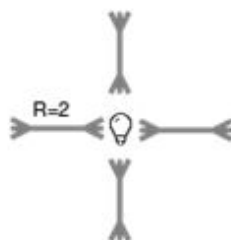
Memory: 1024MB

HackerLand is building a new tunnel system. The tunnel can be viewed as a combination of one or more connected horizontal and vertical pipes. Each pipe has the same width but may have different lengths.

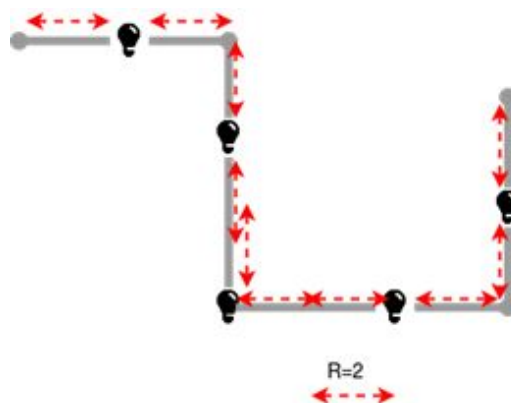
To make the problem simpler, we can consider each tunnel as a straight line. See the image below:



Mayor of HackerLand wants to place light bulbs in the tunnel. Scientists of HackerLand made a special light bulb that has a range R . It can illuminate the tunnel up to R meters in 4 directions (up, down, left and right).



Now the mayor wants to enlighten the whole tunnel using the minimum number of bulbs. So if $R=2$ and you need at least 5 bulbs for example above. One possible placement is shown in the image below:



You can assume that the pipes won't intersect. Given the configuration of the pipes and the range of the bulb, can you find the minimum number of bulbs needed?

Input

The first line contains an integer **T (1<=T<=2000)** denoting the number of test cases. Each test case contains three lines. The first line contains two space-separated integers **N (1<=N<=2000)** and **R (1<=R<=50)** where N denotes the number of pipes in the tunnel. The next line contains N space-separated integers **Li(1<=Li<=1000)**, the ith integer denotes the length of the ith tunnel. The next line contains N space-separated characters. Each character is either 'R', 'U' or 'D' denoting the direction (right, up, down) of the ith tunnel.

Note that, two adjacent tunnels can have same directions. But two pipes will never overlap (there won't be an adjacent U and D in the input).

Output

For each test case, print the case number and the minimum number of bulbs needed.

Sample

| Input | Output |
|------------|------------|
| 5 | Case 1: 5 |
| 4 2 | Case 2: 3 |
| 4 5 5 4 | Case 3: 7 |
| R D R U | Case 4: 16 |
| 2 2 | Case 5: 6 |
| 5 5 | |
| R R | |
| 5 3 | |
| 6 4 5 7 10 | |
| R D R U R | |
| 5 1 | |
| 6 4 5 7 10 | |
| R D R U R | |
| 3 4 | |
| 10 20 15 | |
| R D R | |