Cats vs Dogs

SEASON 7 – ROUND ONE

Lora likes to sleep quite deeply and even though she rarely dreams – her dreams are quite interesting. Now she is dreaming that the peaceful kingdom of which she is queen has been attacked by an army of evil cats. Fortunately, she has an army of dogs ready to protect the kingdom. The war is fought on **F** fronts, numbered from 1 to F. Front number *i* is described as a table with $\mathbf{N_i}$ lines and $\mathbf{M_i}$ columns. The rows and columns of each table are enumerated, starting from 1. The coordinates of the top-left cell are always (1,1). Each cell may be empty('.'), have an obstacle('#') or have a cat, which is described with its strength – a number between 1 and 9('1' to '9'). Lora has a total of **K** dogs available. A dog can be sent to at most one front. When the dog is in a cell, it can only move to one of the four neighboring cells. Lora can choose the dog's starting position and then it can move around the table, the only limits being not to step on cells containing an obstacle and not to go outside of the table. Since it's Lora's dream – whenever a dog steps on a cell with a cat, the dog wins and the cat disappears, regardless of its strength.

The dogs are sent one after another i.e. the second dog can be sent to the front only after the first one has finished its route. A single cat can be beaten only once.

Help Lora use her army as effectively as possible. Efficiency in war is considered as follows:

Let a dog defeat cats with total strength $\mathrm{P_{cats}}$, and moved from one cell to a neighboring W times. Then the effectiveness of the dog is $\mathbf{2} \times \boldsymbol{P_{cats}} - \boldsymbol{W}$.

The efficiency of a front with number *i* is equal to the sum of the effectiveness of all the dogs sent to that front. If there are no cats left, then bonus efficiency $\mathbf{B_i}$ is added to the front.

Efficiency throughout the war is equal to the sum of the efficiencies of each front. This efficiency is the result of your program.

Your task is to tell Lora to which front to send each of the K dogs, as well as their starting positions and routes.

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Input

The first line of the file `catsdogs.in` consists of two integers **F** and **K** – the amount of fronts and dogs, respectively.The descriptions of the fronts follow. Front number *i is described in the following way:*

- A single line consists of $\mathbf{N_i}$, $\mathbf{M_i}$ and $\mathbf{B_i}$ – respectively the number of rows and columns on the front, as well as the bonus received upon removing all cats from the front.
- The following $\mathbf{N_i}$ lines consists of strings of $\mathbf{M_i}$ symbols each, describing the front. All characters are either digits (‘1’~’9’), or ‘#’, or ‘.’

Output

Your program should output information about the plan for each of the **K** dogs in order in the file `catsdogs.out`. The plan for a single dog is described in the following manner:

- If the dog is not used then on a single line you must print the number 0 and proceed to the plan for the next dog. Otherwise, you must output on a single line the number of the front to which the dog is sent.
- On the following line you must print two numbers – the row and the column, which indicate the starting cell of the dog.
- The next line must contain a string consisting of the characters ‘U’, ‘R’, ‘D’, ‘L’, describing the dog’s route. Their meaning is as follows:
  ‘U’ – moving from cell (x, y) to (x-1, y). [**U**p]
  ‘R’ – moving from cell (x, y) to (x, y+1). [**R**ight]
  ‘D’ – moving from cell (x, y) to (x+1, y). [**D**own]
  ‘L’ – moving from cell (x, y) to (x, y-1). [**L**eft]

  If the dog won’t be moving and will remain in its starting cell – then on this line you must print only the string “STAY” (without parenthesis)
  The string describing the route must not exceed 20 000 characters.

Scoring

You will receive 0 points if your output is invalid. An invalid output is any in which one of the following conditions holds:

- There is no information about some of the dogs
- The route of a dog makes it walk on a cell with an obstacle or outside of the table.
- The route of a dog is longer than 20 000 moves.
- The output is not in the format described above.

If your output is valid, you will receive $100 \times (\frac{yourScore+1}{maxScore+1})^2$ percent of the points for the test. We define yourScore as the result, achieved by your solution. Similarly, we define maxScore as the largest result, achieved by the program of any of the competitors.

Constraints

- $1 \leq F \leq 100$
- $1 \leq K \leq 500$
- $1 \leq N_i, M_i \leq 100$
- $0 \leq B_i \leq 10\ 000$
- Time limit – 5 seconds
- Memory limit – 256MB

Subtasks

Amount of tests	Additional constraints
15%	$F = 1$
other 15%	$F \leq 50$ There is no front containing more than 9 cats
other 15%	$K = 1$
other 15%	Each cat has strength 1
other 20%	$F \leq 50$ $N_i, M_i \leq 50$
other 20%	No additional constraints

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Sample test

Input (*catsdogs.in*)	**Output** (*catsdogs.out*)
2 2 3 3 60 2.. 46. .1# 2 5 50 99##4 .#.75	2 1 2 L 2 1 5 DL

Test explanation

The first dog has efficiency of $2 \times (9 + 9) - 1 = 35$, and the second has $2 \times (4 + 5 + 7) - 2 = 30$. We get a bonus of 50 for fully clearing the second field. The result is 115.