2015 Mid-Atlantic Regional Programming Contest
Draft October 31, 2015

Problem A: Hounded by Indecision

OK, maybe stealing the Duchess's favorite ruby necklace was not such a good idea. You were making your way toward the city gates when you heard the sound you had been dreading: a sharp whistle followed by an answering bark. You know that the constable has just fetched his favorite hound and is starting to search for you. They might head straight for a gate. They might try to pick up your trail on the way. You really can't guess. But if they reach the gate before you, you're caught. If they happen across your trail, the hound will pick up your scent. The dog knows your scent already - this isn't your first offense! The constable will loose the hound, who can run *fast* once he has the trail to follow.

You have a dilemma. If you are absolutely sure that you can reach the gates before the guard and before being overtaken by the hound, you can keep the necklace. But if you aren't sure, you need to drop the necklace right now into the nearest pile of rubbish and saunter casually away. Even if they grab you, without the necklace in your hands they will eventually release you.

So, keep the necklace or drop the necklace?

The town is modeled as a rectangular maze of discrete squares. It is surrounded by a wall that contains one or more exits. You know, of course, your own position within the town. You also know the location of the kennel where the constable and the hound start out.

- In each turn (unit of time), you, the constable, and the hound move simultaneously.

- You can move zero or one square(s) horizontally or vertically per turn.

- Initially, the constable and hound move together, also zero or one square(s) vertically or horizontally.

- If the constable and the hound, moving together, reach a square that you have previously occupied, the hound catches your scent and the constable looses the hound. On each subsequent turn, the hound follows your trail at a speed of one or two squares per turn. (The hound moves two squares unless doing so would cause it to jump over the thief or the exit.)

- If the constable and/or the hound overtake you (occupy the same square as you), you are caught. To escape, you must reach an exit at least one turn before the constable and/or hound.

Input

Input consists of one or more mazes. Each maze begins with a line containing two integers, W and H, $3 \le W, H \le 40$, denoting the width and the height of the maze. End of input is indicated when either of these values is less than 3.

This is followed by H lines of input, each containing W characters.
The interpretation of the characters in these lines is as follows:

- ' ' denotes an open space

- 'K' is an open space denoting the kennel and hence the starting position of the constable and the hound. There will be exactly one of these in any maze.

- 'T' is an open space denoting the original position of the thief (you). There will be exactly one of these in any maze.

- 'X' denotes a wall.

- 'E' is an open space representing an exit (a city gate). There will be at least one of these.

  All exits will occur on the outer perimeter (as defined by the W and H values) of the maze.

All mazes will be completely enclosed by a combination of 'X' and 'E' characters. There will be a path from the thief's starting location to each exit and from the kennel to each exit.

Output

For each maze, print a single line of output. If there is a path that you can take that will guarantee that you can escape no matter what path the constable and hound take, then print "KEEP IT". If there is no path that offers such a guarantee, print "DROP IT".

Example

Given the input:

```
19 11
XXXXXXXXXXXXXXXXXXX
X                 X
E                 X
X   XXX XXX   K   X
X   X     X       X
X   X     X       X
X   X T X         X
X   X     X       X
X   XXXXXXX       X
X                 X
XXXXXXXXXXXXXXEXXXX
19 11
XXXXXXXXXXXXXXXXXXX
X                 X
E                 X
X   XXX XXX   K   X
X   X     X       X
X   X     X       X
X   X T X         X
X         X       X
X   XXXXXXX       X
X                 X
XXXXXXXXXXXXXXEXXXX
0 0
```

the output should be:

```
DROP IT
KEEP IT
```

In both cases, we can pretty much ignore the exit at the bottom of the maze. The constable can always get there before the thief.

In the first case, if the thief heads straight for the exit on the left, he emerges from the "door" on turn 4, and reaches the exit on turn 11. On turn 7, the constable can reach the space where the thief had been on turn 4, and would then loose the hound, which also reaches the exit on turn 11, catching the thief.

In the second case, the thief has the option of taking the "side door" out of the house, then heading for the wall before turning right and heading for the exit. It's actually a longer path, taking 13 turns to reach the exit. But the constable won't reach the exit before turn 14, and the earliest that the constable could pick up the thief's trail would be on turn 11 (at the thief's staring location), at which point the constable and hound are too far away to catch the thief.