

## Problem 5—Bomb Squad

Mattel Electronic's "Bomb Squad" was released for the Intellivision System in 1982, making it one of the first console-based games featuring voice synthesis. The game featured a grid of circuits you could probe (think of a circuit as a pixel). Probing a circuit would tell you if it was "on" or "off". As you probed more and more circuits, you would start to see them form an image of a code to disarm the bomb. The trouble is, probing a single circuit would often take several minutes, and time is limited when you are diffusing a time bomb. Thus a key strategy was to minimize the number of probes while still uniquely identifying the disarming code.

You will be given a list of anywhere from 1 up through 15 images of potential disarming codes, but only one image in this list is the true code. Given that these are the only possibilities for the disarming code, you are to determine the smallest number of probes in which one can guarantee to narrow it down to the one true disarming code. For example, take a look at the first data case in the Sample Input below. The three potential codes resemble an O, an L, and a Z. We know that one of these is the code, but we don't know which one. But, if we probe the upper right and lower right corners of the true code, we can obtain the true code. If these corners are respectively <\_,\_> it must be the O; if they are <\_,\*>, it must be the L; if they are <\*,\*>, it must be the Z. Thus, we can identify the true code in two probes, and a careful inspection will verify that there is no way to do it in one.

### INPUT SPECIFICATION.

You will be given a set of input cases. Each case starts with a positive integer, indicating the number of images of potential disarming codes. Each of these images will be 4 wide by 4 high, will consist entirely of \* (asterisk) and \_ (underscore), and will be followed by an extra <EOLN>. "0<EOLN>" will follow the last case.

### OUTPUT SPECIFICATION.

For each case, you are to output the minimum number of probes in which one can guarantee to narrow the list of potential disarming codes down to one code. This number should be followed by <EOLN>.

### SAMPLE INPUT

```
3<EOLN>
_**_<EOLN>
*_**<EOLN>
*_**<EOLN>
_**_<EOLN>
<EOLN>
*__<EOLN>
*__<EOLN>
*__<EOLN>
****<EOLN>
<EOLN>
****<EOLN>
__*__<EOLN>
_*__<EOLN>
****<EOLN>
<EOLN>
1<EOLN>
_**_<EOLN>
*_**<EOLN>
****<EOLN>
*_**<EOLN>
<EOLN>
0<EOLN>
<EOF>
```

### SAMPLE OUTPUT

```
2<EOLN>
0<EOLN>
<EOF>
```