5019 AR Game

Gamebox is developing a new augmented reality game for young kids. Players interact with the virtual object on screen through movements of markers. A marker is a square playing card with special marking. Markers all have different markings. The game is played by showing a marker to the game console. The game console has a hidden video camera that can automatically locate and take a snapshot of the marker being played. Depending on how the card is being held and the distance from the game console, the captured image of the marker maybe displaced from the upright position. Furthermore, noise may be introduced during the imaging process. The marker is then recognized and the game is played accordingly. Obviously, if the marker were incorrectly recognized, then the game would not be played correctly. You are hired as a game programmer to make sure that the markers are recognized correctly.

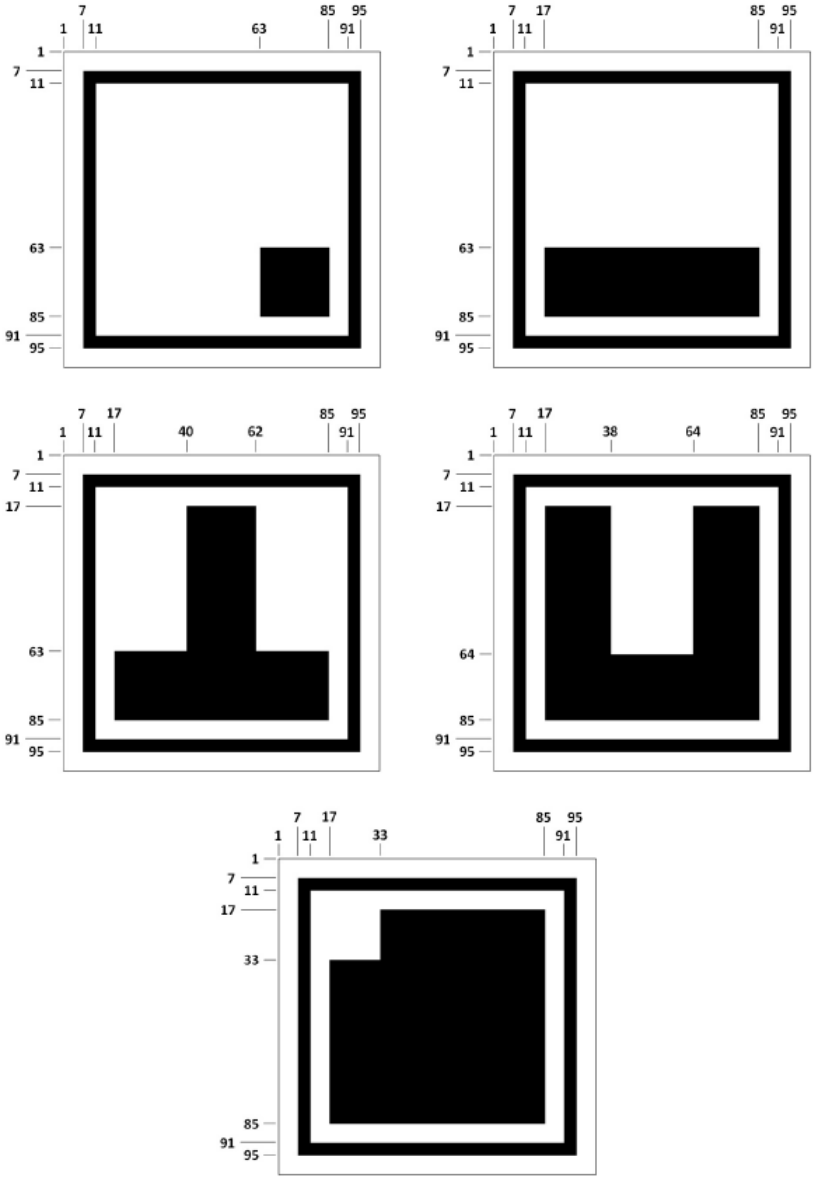

Figure 3: Markers 1, 2, 3, 4, and 5 from left to right.

Constraints:

1. All the images are binary images (containing only two colors: black and white). '0' denotes black pixel and '1' denotes white pixel.
2. There are 5 markers. Each has been digitized into a 100×100 image. The images are shown and described below in graphical form.
3. The captured image (test images) can be
   - Rotated: in 0, 90, 180, or 270 degree angle.
   - Enlarged/shrunk: image size can be of size 50×50, 100×100, 150×150, or 200×200.
   - Contains random noise: at most 3% of the pixels in the input image are reverted. Black becomes white or vise versa.
   - Any combination of the above conditions.

Input

The input file contains a set of test images. Each test image is defined by a single integer n on one line to indicate the image size ($n \times n$). This number is either '0', '50', '100', '150', or '200'. '0' indicates the end of the test data. This is followed by n rows of n consecutive '0's and '1's, which defines the captured image to be processed.

Output

For each input case, output a single integer on one line indicating the marker that matches with the given input image.

Sample Input

```
50
11111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111
11111111111111111111111111111111111111111111111111
11100000000000000000000000000000000000000000000111
11100000000000000000000000000000000000000000000111
11100111111111111111111111111111111111111111100111
11100111111111111111111111111111111111111111100111
11100111111111111111111111111111111111111111100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
11100111111111111111111111111111000000000000011100111
```

```
1110011111111111111111111111111100000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011100000000000000000000000000000000000011100111
1110011111111111111111111111111100000000000011100111
1110011111111111111111111111111100000000000011100111
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1110011111111111111111111111111100000000000011100111
1110011111111111111111111111111100000000000011100111
1110011111111111111111111111111111111111111111100111
1110011111111111111111111111111111111111111111100111
1110011111111111111111111111111111111111111111100111
1110000000000000000000000000000000000000000000000111
1110000000000000000000000000000000000000000000000111
1111111111111111111111111111111111111111111111111111
1111111111111111111111111111111111111111111111111111
1111111111111111111111111111111111111111111111111111
50
1111111111111111111111101111111111111111111111110111
1111111111111111111111111111111111111111111111111111
1111111111111111111111111111111111111111111111111111
1110000000000000000100000000000000000000000000000111
1110100000000000000000000000000000000000000000000111
1110011111111111111111111111101111111111111111100111
1110011111111111111111111111111111111011111101100111
1110011111111111111111111111111111111011111100111
1110011100000000000000000000000001111111111100111
1110011100000000000000000000000100011111101111100110
1110011100000000000000000000000001111111111100111
1110011100000100000000000000000001111111111100111
1110011100000001000000001000000001111111111100111
1110011100000000000000001000000001111111011100101
1110011100000000000000000001000001111111111100111
1110011100000000100000000000000001111111110100111
1110001100000000000000000000000000000000011100111
0110010100000000001000000000000000000000011100111
```

```
11100111000000000000010000000000000000000011100111
10100111000000000000000000000000000000000011100111
11100111000000000000000000000000000000001011100110
01100111000001000000010000000000000000100011100111
11100111000000000000000000000000100000100011100111
11100111000000000000000000000000000010000011100111
11100111000000000000000000000000100010000011110111
11100111000000000000000000000010000000000011100111
11100111000000000000000000000000000000000011100111
11100101000000000000000000000000000000010011100111
11100111000000000000000000000010000000000011110111
11100111011000000000000000000000000000000011100111
11100111000001000000000000000000000000000011100111
11100101000000000000000000000000000100000011100111
11100111000000000000000000000000000000000011000111
11100111000000000000000010000010000000001011100111
10100111000000010000000000000000000000000011100111
11100111000100100000000000000000000000000011100111
11100101010001000000000000000000000000000001100111
11100111000000000000000000000000000000000011100111
11100111000000000000000000000000000000000011100111
11100111000000000000000000000000000000000011100111
11100111000000100100000000000000000000000011100111
11100111000000000000010000000000000000000011100111
11100111111111101111111111111111111111111111100111
11100111111110111111111111111110101111111111100111
11100111111101111111111111111111101111111111100111
11100000000000000000000000000000001000000000111
11100000000000000000000000000010000000000000000111
10111111111111111111111111111111111111111111111111
11111111111111111111111111111111111101111111111111
11111111111111111111111111111111111111111111111111
0
```

Sample Output

```
3
5
```