Problem F - Game of life

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CSC1015F - 2016 - problem set

A geneticist is experimenting with DNA modification of bacteria, which grow in colonies in a linear array of agar plates (plastic dishes with jelly-like stuff that bacteria sit on and eat). By modifying the DNA, she is "programming" the bacteria to respond to the population density of the neighbouring agar plates. For simplicity's sake, the population density is measured on a four point scale, from 0 to 3. The DNA information is represented as an array "DNA" (indexed from 0 to 9) of population density values, which is interpreted as follows:

- For any given agar plate, let K be the sum of that plate's density and the densities of the dish immediately to the left and the dish immediately to the right. Then, by the next day, that dish will have a population density of $DNA[K]$.
- The plate at the far left of the line has a left neighbour with population density 0.
- The plate at the far right of the line has a right neighbour with population density 0.

Some modifications will cause all the bacteria to die off (e.g., [0,0,0,0,0,0,0,0,0,0]), while others result in immediate population explosions (e.g., [3,3,3,3,3,3,3,3,3,3]). The geneticist is most interested in how some of the less obvious intermediate ones might behave.

Write a program to simulate the culture growth in a line of 40 plates, assuming that plate 20 starts with a population density of 1 and all other plates start with a population density of 0.

Input The input has a single positive integer on the first line indicating the number of the cases following. This line is followed by a blank line, the DNA program (modifications) as 10 integer values on one line, and there is also a blank line between two consecutive inputs.

Output For each test case, the output must follow the description below. The outputs of two consecutive cases will be separated by a blank line.

For each input set, print the densities of the 40 plates for each of the next 50 days. Each day's printout should occupy one line of 40 characters. Each plate is represented by a single character on that line. Zero population densities are to be printed as the character ' '. Population density 1 will be printed as the character '`.`'. Population density 2 will be printed as the character '`x`'. Population density 3 will be printed as the character '`W`'.

Sample input

```
1

0 1 2 0 1 3 3 2 3 0
```

Sample output

```
bbbbbbbbbbbbbbbbbb.bbbbbbbbbbbbbbbbbb
bbbbbbbbbbbbbbbbbb...bbbbbbbbbbbbbbbbbb
bbbbbbbbbbbbbbbbb.xbx.bbbbbbbbbbbbbbbbb
bbbbbbbbbbbbbbbb.bb.bb.bbbbbbbbbbbbbbbb
bbbbbbbbbbbbbbb.........bbbbbbbbbbbbbbb
bbbbbbbbbbbbbb.xbbbbbbbx.bbbbbbbbbbbbbb
bbbbbbbbbbbbb.bbxbbbbbxbb.bbbbbbbbbbbbb
bbbbbbbbbbbb...xxxbbbxxx...bbbbbbbbbbbb
bbbbbbbbbbb.xb.WW.xbx.WW.bx.bbbbbbbbbbb
bbbbbbbbbb.bbb.xxWb.bWxx.bbb.bbbbbbbbbb
```

⇒ **Note**: only the first ten lines of output is shown here—the total number of lines must be 50—and the spaces have been replaced with the character "b" for ease of reading. The actual output file will use the ASCII-space character, not "b". ⇐