

Problem E: Harmonious Matrices

Call an $m \times n$ matrix of bits "harmonious" if every cell in it has an even number of 1 bits as neighbors. A cell is a neighbor of itself, and also to the cells above, below, left, and right (if they exist). So the number of neighbors of a cell is at most five, but could be less, depending on where it is. The following is an harmonious 4×4 square of bits:

```
0 1 0 0
1 1 1 0
0 0 0 1
1 1 0 1
```

The task is to write a program which takes as input m and n , and produces an harmonious matrix of m rows and n columns of bits. The solution should avoid the all-zero matrix (if possible).

Input Specification

The input will begin with a number $Z \leq 40$ on a line by itself. This is followed by Z lines, each of which contains two space-separated positive integers m and n , each of which will be at most 40.

Sample Input

```
2
4 4
1 6
```

Output Specification

For each input instance, the output will be an $m \times n$ harmonious matrix of 0s and 1s. The matrix should be non-zero if possible.

Output for Sample Input

```
0 1 0 0
1 1 1 0
0 0 0 1
1 1 0 1
0 0 0 0 0 0
```

Danny Sleator