Exercise 3

A Game on a Hexagram-Shaped Board

Description

Consider the following two-player board game played on a hexagram-shaped board, which consists of 13 cells, each identified by a power of 2, as shown in Figure 1.

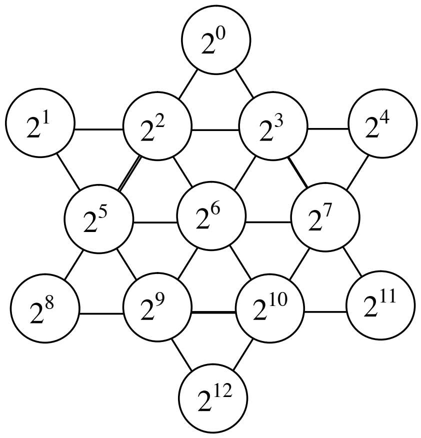

Figure 1: A hexagram-shaped board with 13 cells.

In the beginning of the game, each of some randomly selected M $(1 \leq M \leq 13)$ cells are encircled by a ring. We call such a distribution of rings the *initial state* of a game. It appears that every possible state can be described by a distinct integer S, which is the sum of all numbers (i.e., powers of 2) identifying the encircled cells. For example, in Figure 2(a), the initial state of the board is described as $S = 2^3 + 2^5 + 2^{11} = 2088$. As another example, the board in Figure 2(b) is described as $2^7 + 2^9 + 2^{10} = 1664$.

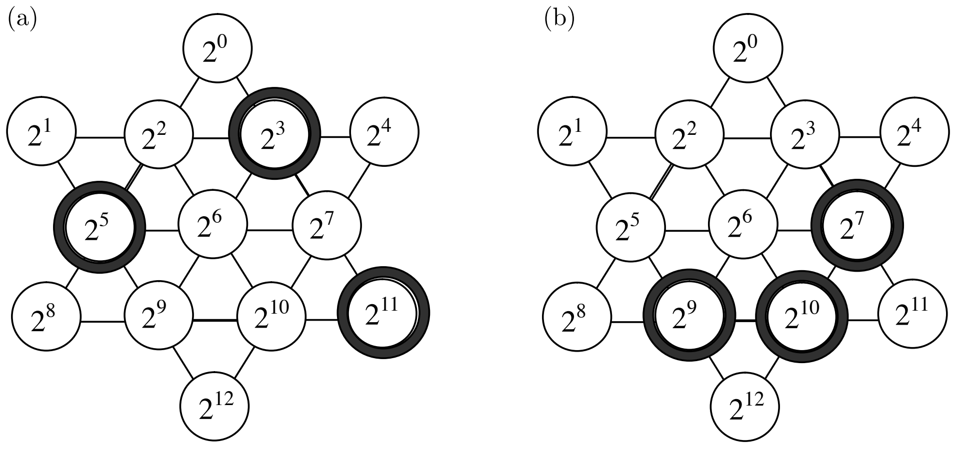

Figure 2: Two initial states of the game: (a) $S = 2^3 + 2^5 + 2^{11} = 2088$ (b) $S = 2^7 + 2^9 + 2^{10} = 1664$

Given the initial state of the board, the game is played with the following rules. The two players take turns removing rings from the board. On each turn, a player must remove one single ring or two *adjacent* rings. (Two rings are said to be adjacent if the cells they encircle are connected by an edge.) The player to remove the last ring *loses*.

It can be proved that either of the two players has a winning strategy in this game. That is, either the player who makes the first removal (hereinafter the *first* player) or the player who makes the second removal (hereinafter the *second* player) can always win, no matter how his/her opponent plays the game.

For example, consider the game started with the initial state in Figure 2(a). None of the rings is adjacent to another, forcing the players to remove a single ring on each turn. Therefore, the second player has a winning strategy since the first player must take the last ring with the other two rings removed.

Similarly, the winning strategy goes to the first player in Figure 2(b), where he/she can always win the game by removing two adjacent rings (e.g., 2^7 and 2^{10}).

Given the initial state of a board, your task is to write a program to determine whether the winning strategy goes to the first or the second player.

Input

The first line of the input contains an integer N, where $1 \leq N \leq 10$, indicating the number of test cases. Each of the following N lines contains a positive integer S, which represents the initial state of a board.

Output

For each case, your program should print either 1 (indicating that the first player has a winning strategy) or 0 (indicating that the second player has a winning strategy) as the answer. Leave a whitespace between cases.

Sampel Input 1

```
3
32
1024
1664
```

Sample Output 1

```
0 0 1
```

Sample Input 2

```
5
6
13
19
2088
2305
```

Sample Output 2

```
1 1 0 0 0
```