G. Zayin and Count

Zayin and Taotao are poor in mathematics. In order to improve their math skill, they count numbers together today. They write a number every second in the ascending order, such as $0, 1, 2, 3$, etc. However, they can't recognize all the Arabic letters. As a result, they both ignore numbers containing the Arabic letters they don't know. For example, if Zayin only knows 0 and 1, he will write down $0, 1, 10, 11$, etc.

For each Arabic letter, you know whether Zayin and Taotao can recognize it. Both Zayin and Taotao can recognize at least two Arabic letters. Besides, you know the number Zayin will write in x-th second. Can you write a program to calculate the number that Taotao will write at this time?

Input

The first line of input contains an integer $T(1 \leq T \leq 10^4)$, denoting the number of test cases.

For each test case, you will get a boolean array a which contains exactly 10 booleans in the first line. If $a_i = 1$ (the index starts at 0), Zayin can recognize Arabic letter i. Otherwise, Zayin can't recognize Arabic letter i.

Similarly, you will get a boolean array b which contains exactly 10 booleans in the second line. If $b_i = 1$ (the index starts at 0), Taotao can recognize Arabic letter i. If $b_i = 0$, Taotao can't recognize Arabic letter i.

In the third line, you will get the number Zayin will write in x-th ($x \leq 2^{64}$) second.

Output

For each test case, you should write down the number that Taotao will write in x-th second in a single line.

Sample

Input	Output
1 1 0 1 0 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 20	10