B - Bagong's String

Run-time Limit: 1 second

Memory Limit: 32 MB

DESCRIPTION

Bagong really loves playing with string. Bagong currently loves letters A, B, and C. Because of that, Bagong wants to make a string of length K which consists of those letters. Bagong asks Petruk to determine the number of all possibilities. After thinking hard, Petruk finally finds the answer that there are 3^K possibilities.

Bagong thinks that the question is too easy. To make it harder, Bagong also determines that the number of each letter can be even or odd. For example, Bagong determines that the number of letter A is odd, the number of letter B is even, and the number of letter C is odd, and the length is 2. The only possibilities are AC and CA, so the answer is 2.

You are given the parity (even or odd) of number of each letter, and the length of the string. Please determine the number of string that matches with Bagong's requirements.

INPUT FORMAT

The first line of input contains an integer T ($1 \leq T \leq 1000$) denoting the number of cases. Each case contains 4 integers P_A, P_B, P_C, K ($0 \leq P_A,P_B,P_C \leq 1$, $1 \leq K \leq 10^{18}$) denoting the parity of number of A, B, and C, and the length of the string, respectively. The parity of number of a letter i ($i \in \{A,B,C\}$) is even if P_i is 0 (consider that 0 is an even number), otherwise it is odd.

OUTPUT FORMAT

For each case, output “Case #X: Y”, where X is the case number starts from 1, and Y is the number of string that matches with Bagong's requirements. If there is no string that matches with Bagong's requirements, output -1. Because Y can be very large, output Y in modulo 1000000007.

INPUT EXAMPLE

```
4
1 0 1 2
0 1 0 3
1 1 1 3
0 0 0 99999
```

OUTPUT EXAMPLE

```
Case #1: 2
Case #2: 7
Case #3: 6
Case #4: -1
```

EXPLANATION

In 1st case, the possibilites are AC and CA, as explained in the description.

In 2nd case, the possibilities are BBB, AAB, ABA, BAA, CAA, ACA, and AAC.

In 3rd case, the possibilities are ABC and its permutations.

In 4th case, clearly there is no string that matches with Bagong's requirements. Therefore, the output should be -1.