Outro: True Love Waits

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	512 megabytes

People often harbor various interpretations of life. Some navigate it smoothly, discovering its meaning at the loftiest peaks, while some encounter misfortune time and time again, lamenting the fleeting nature of life akin to the falling of snow, yet burning it to fight for better situations.

Regardless, life is intricate and filled with worthwhile things to explore. For programmers like you, it is reasonable to conceptualize life as touring an infinite graph — a graph consisting of an infinite number of vertices and edges, to be precise. Its vertices, indicating all possibilities of life, are numbered starting from 0, and for every unordered pair of vertex u and vertex v, if the binary representations of u, v differ by exactly one bit which is the w-th bit from low to high, then there exists an undirected edge between them with weight w. For example, the undirected edge $(2, 6)$ with weight 3 exists in the graph because $2 = (10)_2$, $6 = (110)_2$, where the third bit is the only bit different, but the edge $(5, 6)$ does not exist because $5 = (101)_2$, $6 = (110)_2$, where there are two bits different between the binary representations.

Initially, you stand on vertex s, and you believe that true love, not necessarily being a certain person, should inhabit on vertex t. Then you begin the tour to seek true love in life from dawn to dusk. Every moment, you feel unsatisfied with the vertex you are currently on and decide to let go of it. Therefore, among all the edges connecting to this vertex, you choose the one with minimum weight, move through it to the other vertex, and permanently cut this edge from the graph (Uh, it seems like swearing never to come back). Since the tour is endless and the faith in true love is boundless, you become interested in when you will reach vertex t for the k-th time (Particularly, the initial state is regarded as the first time you reach vertex s). Find out the number of edges you will cut along the tour, modulo $10^9 + 7$, or report it's impossible to reach vertex t for the k-th time.

Input

The input contains several test cases, and the first line contains a single integer T ($1 \le T \le 10^5$), denoting the number of test cases.

For each test case, the only line contains three integers s, t, k ($0 \le s, t < 2^{10^6}, 1 \le k \le 10^9$), where s, t are given in binary representation without any extra leading zeros, and k is given in decimal representation.

It is guaranteed that the sum of the lengths of binary representations over all test cases does not exceed 10^7.

Output

For each test case, if it's impossible to reach vertex t for the k-th time, output -1 in one line. Otherwise, output the number of edges you will cut in one line, modulo $10^9 + 7$.

Example

standard input	standard output
4 1 10 1 1 10 2 100 0 2 11 11 3	2 -1 9 20

Note

In the first test case, you will reach vertex 2 for the first time by trail $1 \xrightarrow{w=1} 0 \xrightarrow{w=2} 2$, so there will be 2 edges cut. Also starting from vertex 1, it can be proved that once you let go of vertex 2 when you reach it for the first time, you will really never come back forever. Thus, the answer for the second test case is -1.