Problem E. Exhibitions

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	512 megabytes

Camilla is taking a trip to Bytetown, Byteland. There are two main activities in Bytetown, swimming in a warm salty ocean and visiting the museum. Every day Camilla has to choose which one of the two activities to do.

There are two kinds of exhibitions in the Bytetownian Museum. The first kind occur on weekly basis: every exhibition holds every week at a certain day of week. The second kind occur on monthly basis and follow the same rule. All weekly and monthly exhibitions are different. Someday it may happen that both a weekly and a monthly exhibitions happen — what a lucky day for visitors, they can watch both of them during a single day!

Camilla wants to visit each exhibition at least once. She knows that Bytelandian week is p days and month is q days. When she arrives at Bytetown, it will be the first day of week and month (what a rare coincidence). She is going to stay in Bytetown for n days.

Besides exhibitions, Camilla likes swimming a lot, so she wants to spend the least possible number of days on going to the museum. Help Camilla to plan her vacation and find the minimum number of days required to visit all exhibitions.

Input

In the first line of input there are three numbers n, p, q ($1 \le n \le 10^{18}$, $1 \le p, q \le 10^7$). Two next lines contain strings of length $\lceil p/4 \rceil$ and $\lceil q/4 \rceil$ respectively containing digits and letters `a-f`, describing weekly and monthly exhibitions in hexadecimal format. The format description for weekly exhibitions is described below; monthly description follows the same format.

First, we write down a binary string of length p, where i-th ($1 \le i \le p$) character is `1` if there is an exhibition on i-th day of a week and `0` otherwise. Then we append zeroes to the end of the string until its length is divisible by 4. Then we split the string into blocks of length 4 and encode each block as a hexadecimal digit, least significant bits first.

For example, if $p = 6$ and exhibitions happen on days 2, 3, 4, and 6, we get the string `011101`. We append zeroes and get `01110100`. Finally, we encode this string as `e2` because $e_{16} = 14_{10} = 1110_2$ and $2_{16} = 2_{10} = 0010_2$.

Output

Print a single number, the minimum required number of days or "`-1`" if Camilla cannot visit all exhibitions.

Examples

standard input	standard output
6 4 3 4 3	3
7 4 3 4 3	2
2 4 3 4 3	-1
100 48 33 596dda1c04c3 abc0abfe1	27

Note

In three first sample tests weeks are 4 days long and months are 3 days long. Weekly exhibitions are held only on the third day of week, monthly are held on the first and second days of month.

In the first sample Camilla has 6 days for her visits. She can visit the museum on the first three days, seeing one exhibition each day.

In the second sample she has 7 days. She can visit the museum on the day 2, seeing the second monthly exhibition, and on the day 7, seeing the weekly exhibition and the first monthly exhibition at the same time.

In the third sample Camilla does not have enough time to see the weekly exhibition at all.