L. Immense integers

Difficulty: Demon **Time**: 2 s **Memory**: 1024 MB

by shcal and canin3

You're given two real numbers $0 < x, y < 1$. In one operation, you can halve the distance between x and 1 or between x and 0. Formally, for each operation, you may do one of the following:

- $x := (1 + x)/2$
- $x := x/2$

You are also given a tolerance $0 < t < 1$. What is the minimum number of operations (possibly none) needed so that $|x - y| \le t$?

Input

The input consists of 3 binary strings x, y, t separated by a newline.

All numbers are fractions strictly between 0 and 1, specified in base-2 with at most 10^6 digits. That is, each number is given as a binary string $s_1 \ldots s_n$ ($s_i = 0$ or 1) for some $n \ge 1$ and corresponds to $\sum_{i=1}^{n} s_i 2^{-i}$.

Output

Output a single integer: the number of operations required to satisfy the given tolerance, which may be 0.

Sample 1

Input

```
01
00101
00010
```

Output

```
1
```

Explanation

Here, $x = 0 \cdot 2^{-1} + 1 \cdot 2^{-2} = 1/4, y = 5/32$, and $t = 1/16$.

Before any operations, $|x - y| = |1/4 - 5/32| = 3/32 > 1/16 = t$, so the constraint is not already satisfied and we must perform at least one operation.

After one operation with $x := x/2$, $x = 1/8$ and $|x - y| = |1/8 - 5/32| = 1/32 \le 1/16 = t$. Hence the answer is 1.

Sample 2

Input

```
0001101110
0011111110
00000101
```

Output

```
3
```

Sample 3

Input

```
01000101101100010110111101
01011010111011011010100 11
00000000000000000000011
```

Output

```
17
```