

Problem B. Broken Sequence

Input file: *standard input*
 Output file: *standard output*
 Time limit: 4 seconds
 Memory limit: 64 mebibytes

Let X be a sequence (x_1, x_2, \dots, x_n) . Then the *nonperiodic autocorrelation function* $N_X(s)$ is:

$$N_X(s) = \sum_{i=-\infty}^{\infty} x_i x_{i+s},$$

where s is an integer. Here we assume that $x_i = 0$ for $i < 1$ and $i > n$.

Consider four sequences (A, B, C, D) of length $n, n, n,$ and $n - 1$ correspondingly, all elements of which are from set $\{-1, +1\}$. These four sequences form the *TT-sequence* (Turyn-Type sequence) if and only if

$$N_A(s) + N_B(s) + 2N_C(s) + 2N_D(s) = 0, \text{ for all integer } s > 0.$$

TT-sequences are very interesting because they allow building Hadamard matrices which find applications in such fields as signal processing and coding theory. For example, a *TT*-sequence for $n = 36$ (which has been found in 2005) allowed to construct a Hadamard matrix of order 428 for the first time.

Given a *TT*-sequence where several elements are missing, restore the initial *TT*-sequence.

Input

The four lines contain four strings of length n, n, n and $n - 1$ ($2 \leq n \leq 36, n$ is even) which encode sequences A, B, C and D . The i -th symbol encodes the i -th element of the corresponding sequence. “-” denotes -1 , “+” denotes $+1$, and “?” denotes a missing element. The total number of the missing elements does not exceed 30.

It is guaranteed that for the given data a single solution exists.

Output

Output four strings of length n, n, n and $n - 1$ — the restored *TT*-sequence. See samples for better understanding of output format.

Examples

standard input	standard output
+++-?-+	++-+-+
+----?-+	+-----+
+---+?+-	+-----+
+++-+?-	+++-+-
+++----+--+?+?--++++-+-+-----+	+++----+--+-----++++-+-+-----+
+-----+?+-----+---+---?+++-----+	+-----+-----+---+---++++-----+
+-----+---?+++++?+-----+-----+?+---	+-----+-----+-----+-----+-----+
+++-+?-----+---+---+?+-----+-----+	+++-+-----+-----+-----+-----+