F Ambiguous Encoding

A friend of yours is designing an encoding scheme of a set of characters into a set of variable length bit sequences. You are asked to check whether the encoding is ambiguous or not. In an encoding scheme, characters are given distinct bit sequences of possibly different lengths as their codes. A character sequence is encoded into a bit sequence which is the concatenation of the codes of the characters in the string in the order of their appearances. An encoding scheme is said to be ambiguous if there exist two different character sequences encoded into exactly the same bit sequence. Such a bit sequence is called an "ambiguous binary sequence".

For example, encoding characters 'A', 'B', and 'C' to 0, 01 and 10, respectively, is ambiguous. This scheme encodes two different character strings "AC" and "BA" into the same bit sequence 010.

Input

The first line of the input consists of one integer T — the number of test cases ($1 \leq T \leq 1000$). Each test case has the following format:

- The first line contains an integer n — the size of the set of characters to encode ($1 \leq n \leq 500$).

- The next n lines contain the bit sequence w_i for the i-th character as a non-empty sequence of at most 16 binary digits (0 or 1).

Different characters are given different codes within the same test case, that is, $w_i \neq w_j$ for $i \neq j$.

Sum of all n across test cases is at most 10^4

Output

For each test case, if the given encoding is ambiguous, print in a line the number of bits in the shortest ambiguous binary sequence. Output zero otherwise.

Samples

Sample input 1	Sample output 1
3 3 0 01 10 3 00 01 1 3 00 10 1	3 0 0

Sample input 2	Sample output 2
2 10 1001 1011 01000 00011 01011 1010 00100 10011 11110 0110 3 1101 1 10	13 4

Notes

Hint: shortest path

Scoring

- 10%: sample tests.

- 30%: $n \leq 20, |w_i| \leq 5$.

- 30%: $n \leq 50, |w_i| \leq 8$.

- 30%: $n \leq 1000, |w_i| \leq 16$.