Problem I. Hong Kong

As all of you might know, the lovely King Kong lives in Hong Kong and loves playing ping pong. However, what he does not like is listening to numbers in order to understand the instructions".

In the beginning of everyday, King Kong hears some sequence of numbers (e.g. "7823") that is mapped to an instruction (e.g. "Sing Song"). After King Kong realises the instruction, Then he can start doing that action for rest of the day. The problem is that King Kong has no bedtime schedule and thus he could wake up at in the middle of the sequence. When King Kong wakes up, he wants to to find the mapped instruction as soon as possible. As a result, he only listens to the sequence up until he can be sure that there is only one unique instruction mapped to this sequence.

Your task is to calculate the average amount of time that King Kong has to listen to the sequence until he can uniquely identify the instruction.

Input

First, you will be given an integer $N \leq 10^5$, identifying the number of different instructions. Next N lines will contain contain N sequence, and their total length will not exceed 10^5.

Output

Print N lines. The i-th line should be the expected number of seconds King Kong has to listen to the numbers before he can be certain of the instruction. Your answer will be judged relative to a relative error of 10^{-5}. If it is possible that King Kong could not understand the instruction print "*Impossible*".

Examples

test	answer
4 496 28494 237 596	Impossible 2 1.333333333 Impossible

Explanations

For the First sequence, if he wakes up on the 8 then he will hear "85", and therefore cannot tell it apart from the fourth sequence. Thus the answer here is "*Impossible*". For the Second message (28494), there are 5 possible spots where King Kong could wake up. If he wakes up in at the first digit, it could still be the third sequence (237) since both contain a 2. Once he hears the following 8, it could only be the second sequence. Therefore, waking up at this digit takes 2 seconds. If he wakes up on the second digit, it takes 1 second. The third digit takes 3 seconds, the fourth digit takes 2 seconds, and the fifth digit takes 2 seconds (he hears the 3, then hears silence). This gives an average of $\frac{(2+1+3+2+2)}{5} = 2$.