Problem H
Cancer DNA

Time Limit: 10 seconds

The *Investigation Center for Potential Cancer (ICPC)* found out patterns of a DNA sequence that cause cancer! We would like you to write a computer program that approximates the probability that a random DNA sequence matches one of the given patterns.

A DNA sequence can be represented by a string consisting of four letters, '`A`', '`G`', '`C`', and '`T`'. A *DNA pattern* is a string over the same four letters plus '`?`'. We say that a DNA pattern *matches* a DNA sequence of the same length if each of the characters in the pattern is either '`?`' or is the same as the character at the corresponding position in the DNA sequence. For example, a pattern "`AC?`" matches DNA sequences "`ACA`", "`ACG`", "`ACC`", and "`ACT`".

Your task is to write a program that, given a set of DNA patterns of the same length, computes the probability that a uniformly random DNA sequence of the same length matches any of the given patterns. A multiplicative error up to 5% is permissible.

Input

The input consists of a single test case of the following format.

n m
P_1
$\vdots$
P_m

The first line of the input contains two positive integers n and m such that $1 \leq n \leq 100$ and $1 \leq m \leq 30$ hold. The next m lines contain m patterns $P_1, \ldots, P_m$. Each pattern P_i is a string of length n over '`A`', '`G`', '`C`', '`T`', and '`?`'.

Output

Let S be a DNA sequence of length n chosen uniformly at random. Let w be the probability that S matches at least one of $P_1, \ldots,$ and P_m. The output is a real number v that approximates w.

The output v is judged to be correct if v approximates w within a multiplicative error of 5%, i.e.,

$$0.95 \times w \ \leq \ v \ \leq \ 1.05 \times w.$$

v should be represented either with or without exponent component. For example, 0.045 can be represented as `4.5e-2` or `0.045`.

Sample Input 1	Sample Output 1
3 1 AC?	0.0625

Sample Input 2	Sample Output 2
6 2 AC??A? A??A?T	0.0302734375

Sample Input 3	Sample Output 3
30 1 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA	8.673617379884035e-19

In the first sample, there are 4^3 DNA sequences of length 3. There are 4 DNA sequences, "ACA", "ACG", "ACC", and "ACT", that match the pattern "AC?". Thus, the probability is $4/4^3 = 0.0625$. Any real number between 0.059375 and 0.065625 is accepted as a correct output.

As in the third sample, the probability can be a small real number. Note that "0" is not a correct output, as 0 is less than 95% of the precise probability.