The Least Number

You are given n symbols a_1, a_2,..., a_n. You are told that there is a total ordering of the symbols. That is, there is a permutation [P1, P2,..., Pn] of [1,2,...,n] such that $a_{P1} < a_{P2} <...< a_{Pn}$. You are trying to figure out the order by doing comparisons. The process you follow for determining the order is as follows:

- Compare [a_1, a_2]
- Compare [a_2, a_3], [a_1, a_3]
- Compare [a_3, a_4], [a_2, a_4], [a_1, a_4]
- ....
- ....
- Compare [a_{n-1},a_n], [a_{n-2},a_n],..., [a_1, a_n]

Note that you compare in the order specified. That is you compare [a_2, a_3], then and only then do you compare [a_1, a_3].

Definition of Compare[a_i, a_j] (i < j)

- If Compare [a_i, a_j] = 1, it means $a_i > a_j$. If Compare[a_i, a_j] = -1, it means $a_i < a_j$.
- Compare is consistent. Suppose, that you queried [a_2, a_6] and it was already established [$a_2 < a_6$] (because for example $a_2 < a_5$ and $a_5 < a_6$ - since both of these comparisons happen earlier), then [a_2, a_6] returns -1.
- If no relationship is known between a_i and a_j, Compare[a_i, a_j] = 1 with probablity 1/2 and -1 with probability 1/2

Your task is to output the probability that a_1 is the smallest element of the final ordering so obtained.

Input

First line contains T, the number of test cases

Each of the next T lines contains one number each, **n**(1 <= n <= 1000).

Output

Output T lines in total, one per test case: Probability that a_1 is indeed the smallest element at the end of the comparisons. Your output will be judged correct if it differs by no more than 10^{-9} to the reference answer.

Example

Input:

3

1

2

3

Output:

1

0.500

0.3750000

Explanation:

n = 1 is trivial

For n = 2, only comparison is [a_1, a_2]. a1 is lower with probability 1/2.

For n = 3, a1 is not the least element if either ($a_1 > a_2$) or ($a_1 < a_2$ and $a_3 < a_2$ and $a_3 < a_1$).

So, probability that a_1 is not the least element = 1/2 + 1/8 = 5/8. Probability that a_1 is the least = 3/8 = 0.375.