

Loop Expectation

Consider the following pseudo-code

```
int a[1..N];  
int max = -1;  
for i = 1..N:  
    if(a[i] > max)  
        max = a[i];
```

Your task is to calculate the expected number of times the 'if' block of the above pseudo-code executes. The array 'a' is a random permutation of numbers from 1..N chosen uniformly at random.

Input

First line contains t, the number of test cases. t lines follow, each containing N, the number of elements in the array.

$1 \leq t \leq 100$

$1 \leq n \leq 100,000$

Output

For each test case, output a single decimal. Your answer should be within 10^{-6} of the correct answer.

Example

Input:

1
2

Output:

1.5

Explanation :

for $N=2$, you can have the following two permutations: $[1,2]$ and $[2,1]$.

for the first case the if block gets executed 2 times and for the second one the if block gets executed 1 time. So the expected value is $(3)/2 = 1.5$