

Just Multiplicative Inverse

Input file: **standard input**
Output file: **standard output**
Time limit: 1 second
Memory limit: 1024 megabytes

Yukikaze is learning number theory. She found a mysterious function to compute multiplicative inverse of integers modulo a prime p . The pseudocode of the function is as follows:

```
1: function F( $x, p$ )  
2:   if  $x \leq 1$  then  
3:     return 1  
4:   else  
5:     return  $- \lfloor p/x \rfloor \cdot F(p \bmod x, p) \bmod p$   
6:   end if  
7: end function
```

She wants to know the expected number of calls if she calls this function with a random integer uniformly distributed in the range $[1, p - 1]$.

Input

The first line of the input contains a single integer T ($1 \leq T \leq 100$), denoting the number of test cases.

Each of the next T lines contains a single integer p ($2 \leq p \leq 10^6$, p is a prime), denoting the parameter of the function described above.

Output

For each test case, output the answer in a single line.

Your answer is considered correct if its absolute or relative error does not exceed 10^{-6} .

Formally, let your answer be a , and the jury's answer be b . Your answer will be accepted if $\frac{|a-b|}{\max\{1, |b|\}} \leq 10^{-6}$.

Example

standard input	standard output
5	1.0000000000
2	1.5000000000
3	2.0000000000
5	2.1666666667
7	15.9864347558
999983	

Note

For the 4-th test case in example, we have:

$$\begin{aligned} &F(1, 7) \\ &F(2, 7) \rightarrow F(1, 7) \\ &F(3, 7) \rightarrow F(1, 7) \\ &F(4, 7) \rightarrow F(3, 7) \rightarrow F(1, 7) \\ &F(5, 7) \rightarrow F(2, 7) \rightarrow F(1, 7) \\ &F(6, 7) \rightarrow F(1, 7) \end{aligned}$$

So the answer is $(1 + 2 + 2 + 3 + 3 + 2)/6 = 2.16666666 \dots$.