Clock Master

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

With the rapid development of society, the demand for high-precision clocks is constantly rising. Recently, the China Clock Production Company is developing a new type of clock, which can represent a wide range of times.

The novel clock displays the current time in an unusual fashion. The clock consists of several pointers, each controlled by a gear. All gears rotate synchronously – one tooth per period. However, the numbers of teeth of the gears may differ. If a gear has t teeth, then the corresponding pointer can point to t different directions, denoted $0, 1, 2, \cdots, t-1$, respectively, where 0 is the initial direction. Furthermore, if a clock is equipped with n pointers, the i-th of which is controlled by a t_i-tooth gear, then the i-th pointer will point to $k \bmod t_i$ after k periods of time.

The price for a t-tooth gear is t yuan. Given a total budget of b yuan, you need to design a combination of gears, such that the number of valid combinations of directions of pointers is maximized, and the total cost on gears does not exceed the budget. A combination of directions $(d_1, d_2, \cdots, d_n)$ is valid, if it can be written

$$(k \bmod t_1, k \bmod t_2, \cdots, k \bmod t_n)$$

for some nonnegative integer k, where t_i is the number of teeth of the i-th gear. Since the answer may be too large, output the answer in natural logarithm (logarithm with base $e = 2.718281828\cdots$).

Input

The first line of input is a single integer T ($1 \le T \le 30\,000$), indicating the number of test cases. Each test case is a single line of an integer b ($1 \le b \le 30\,000$), denoting the total budget.

Output

For each test case, print the natural logarithm, within an absolute or relative error of no more than 10^{-6}, of the maximum number of valid combinations, in a single line.

Example

standard input	standard output
3 2 7 10	0.693147181 2.484906650 3.401197382

Note

For the second sample data, a 3-tooth gear along with a 4-tooth gear may yield 12 different combinations of directions, with total cost exactly being 7. So you should print the value of $\ln 12$, which is approximately 2.484906650.