Problem D. Standard Deviation

Input:	`standard`
Output:	`standard`
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In mathematics, the standard deviation of a set of n integer numbers is defined as:

$$S = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{n-1}}$$

where $\overline{x}$ is the average of the set of n integer numbers for which the standard deviation is being calculated. That average is calculated as:

$$\overline{x} = \frac{1}{n} \cdot \sum_{i=1}^{n} x_i$$

The task is to calculate, **in an efficient way**, the standard deviation of the first n odd positive integer numbers.

Input

There are several test cases in the input. Each test case consists of a single line containing a positive integer number n ($2 \leq n \leq 10^6$) which indicates the amount of consecutive odd numbers (starting from one) that should be considered when calculating the standard deviation. The last test case has a value of 0, for which you shouldn't generate any response.

Output

For each test case, you should print a single line containing a floating point number: the standard deviation of the first n odd positive numbers. The absolute error of your answer should not be greater than 10^{-6}.

Example

Input	Output
10	6.055301
100	58.022984
1000	577.638872
10000	5773.791360
100000	57735.315593
1000000	577350.557865
0	

Use fast I/O methods