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

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

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

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

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}.

Sample Input

```
10
100
1000
10000
100000
1000000
0
```

Sample Output

```
6.055301
58.022984
577.638872
5773.791360
57735.315593
577350.557865
```