The function $F(n)$ is defined as:

$$F(0) = 2^{0.5} + 3^{0.5} + 6^{0.5} \quad (1)$$
$$F(n) = (F(n-1)^2 - 5)/(2 * F(n-1) + 4) \quad (2)$$

Given N, find $F(N)$. Note that N can be very large!

Input

A number of test cases (≤ 1000), one per line, with the number of value of integer N ($0 \leq N \leq 10^{1500}$).

Output

For each test case, output $F(N)$ on a single line, rounded to exactly 10 digits after the decimal.

Sample Input

```
0
1
```

Sample Output

```
5.5957541127
1.7320508076
```