

The real arctangent

Compute 101 significant figures of the arctangent of a real number.

Input

The first line of the input contains the number of test cases. In each of the following lines, a single real number $0 \leq x \leq 10$ is given, in the usual decimal notation. The number of decimal digits of x is not more than 101.

Output

Each line of the output should be the sequence consisting of the first 101 significant decimal digits of the arctangent of x . All trailing and leading zeroes, as well as the decimal point (if any) should be removed.

Example

Input:

```
3
0
1
2.718281828459045235360287
```

Output:

```
0
78539816339744830961566084581987572104929234984377645524373614807695410157155224965700870633552926699
12182829050172776217604617127291832691014807688333489455796019635447595534415986839011077205055833227
```