Problem F. Fourier

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Given $n = 2^k$ complex numbers $a_0, \ldots, a_{n-1}$, their *discrete Fourier transform* $x_0, \ldots, x_{n-1}$ is defined as follows:

$$x_k = \sum_{j=0}^{n-1} a_j \cdot e^{-i \cdot 2\pi \cdot jk/n}.$$

You are given n integers $a_0, \ldots, a_{n-1}$. Produce n real numbers $b_0, \ldots, b_{n-1}$ such that all values of their Fourier transform are real (that is, their imaginary part is zero) and the total difference $\sum_{i=0}^{n-1} |a_i - b_i|$ is as small as possible.

Input

The first line of input contains one integer n ($1 \leqslant n \leqslant 2^{20}$, n is a power of two). The second line of input contains n space-separated integers $a_0, \ldots, a_{n-1}$ ($|a_i| \leqslant 10^9$).

Output

Print one real number: the minimal achievable total difference. Your answer will be accepted if the absolute or relative difference from the correct answer will not exceed 10^{-9}.

Example

standard input	standard output
4 1 2 3 4	2.000000000