Project Euler #64: Odd period square roots

This problem is a programming version of Problem 64 from projecteuler.net

All square roots are periodic when written as continued fractions and can be written in the form:
$$\sqrt{N} = a_0 + \frac{1}{a_1 + \frac{1}{a_2 + \frac{1}{a_3 + \cdots}}} $$

For example, let us consider $\sqrt{23}$:

$$\sqrt{23} = 4 + \sqrt{23} - 4 = 4 + \frac{1}{\frac{1}{\sqrt{23} - 4}} = 4 + \frac{1}{1 + \frac{\sqrt{23} - 3}{7}}$$

If we continue we would get the following expansion:
$$\sqrt{23} = 4 + \frac{1}{1 + \frac{1}{3 + \frac{1}{1 + \frac{1}{8+ \cdots}}}} $$

The process can be summarised as follows:
$$\begin{align*}
a_0 &= 4, \frac{1}{\sqrt{23}- 4} &&= \frac{\sqrt{23} + 4}{7} &= 1 + \frac{\sqrt{23}-3}{7} \\ a_1 &= 1, \frac{7}{\sqrt{23}- 3} &&= \frac{7(\sqrt{23} + 3)}{14} &= 3 + \frac{\sqrt{23}-3}{2} \\ a_2 &= 3, \frac{2}{\sqrt{23}- 3} &&= \frac{2(\sqrt{23} + 3)}{14} &= 1 + \frac{\sqrt{23}-4}{7} \\ a_3 &= 1, \frac{7}{\sqrt{23}- 4} &&= \frac{7(\sqrt{23} + 4)}{7} &= 8 + \sqrt{23}-4 \\ a_4 &= 8, \frac{1}{\sqrt{23}- 4} &&= \frac{\sqrt{23} + 4}{7} &= 1 + \frac{\sqrt{23}-3}{7} \\ a_5 &= 1, \frac{7}{\sqrt{23}- 3} &&= \frac{7(\sqrt{23} + 3)}{14} &= 3 + \frac{\sqrt{23}-3}{2} \\ a_6 &= 3, \frac{2}{\sqrt{23}- 3} &&= \frac{2(\sqrt{23} + 3)}{14} &= 1 + \frac{\sqrt{23}-4}{7} \\ a_7 &= 1, \frac{7}{\sqrt{23}- 4} &&= \frac{7(\sqrt{23} + 4)}{7} &= 8 + \sqrt{23}-4 \\ \end{align*}$$

It can be seen that the sequence is repeating. For conciseness, we use the notation $\sqrt{23} = [4;(1,3,1,8)]$, to indicate that the block $(1,3,1,8)$ repeats indefinitely.

The first ten continued fraction representations of (irrational) square roots are:

$\sqrt{2}=[1;(2)], period=1$
$\sqrt{3}=[1;(1,2)], period=2$
$\sqrt{5}=[2;(4)], period=1$
$\sqrt{6}=[2;(2,4)], period=2$
$\sqrt{7}=[2;(1,1,1,4)], period=4$
$\sqrt{8}=[2;(1,4)], period=2$
$\sqrt{10}=[3;(6)], period=1$
$\sqrt{11}=[3;(3,6)], period=2$
$\sqrt{12}= [3;(2,6)], period=2$
$\sqrt{13}=[3;(1,1,1,1,6)], period=5$

Exactly four continued fractions, for $x \le 13$, have an odd period.

How many continued fractions for $x \le N$ have an odd period?

Input Format
Input contains an integer N

Output Format
Print the answer corresponding to the test case.

Constraints
$10 \le N \le 30000$

Sample Input

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13
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Sample Output

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4
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