Project Euler #180: Rational zeros of a function of three variables.

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This problem is a programming version of Problem 180 from projecteuler.net

For any integer n, consider the three functions

- $f_{1,n}(x,y,z) = x^{n+1} + y^{n+1} - z^{n+1}$
- $f_{2,n}(x,y,z) = (xy + yz + zx)(x^{n-1} + y^{n-1} - z^{n-1})$
- $f_{3,n}(x,y,z) = xyz(x^{n-2} + y^{n-2} - z^{n-2})$

and their combination

$$f_n(x,y,z) = f_{1,n}(x,y,z) + f_{2,n}(x,y,z) - f_{3,n}(x,y,z)$$

We call (x,y,z) a golden triple of order k if x, y and z are all rational numbers of the form $\frac{a}{b}$ with $0 < a < b \leq k$ and there is (at least) one integer n, so that $f_n(x,y,z) = 0$.

Let $s(x,y,z) = x + y + z$. Let $t = \frac{u}{v}$ be the sum of all distinct $s(x,y,z)$ for all golden triples (x,y,z) of order k. All the $s(x,y,z)$ and t must be in reduced form.

Find $u + v$.

Input Format

Input contains the only integer k which is the order of golden triples.

Constraints

- $2 \leq k \leq 35$

Output Format

Output the only number which is the answer to the problem.

Sample Input 0

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2
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Sample Output 0

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1
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Explanation 0

There are no such x, y and z that $f_n(x, y, z) = 0$ for $k = 2$, so $t = \frac{0}{1}$ and you should output 1.