

We find value A such that

$$2 \frac{F(1/2)}{Q(1/2)} \geq \frac{4A^2}{|R_A|} - A \quad (1)$$

where $F(y)$, $Q(y)$ and R_A denoty be lemma 5.3 from arXiv:2010.04982.

For fast calculation we use form

$$\begin{aligned} F(y) &= 2 \sum_{k=0}^{|R_A|-1} \left(\sum_{i=0}^{|R_A|-1} s_i s_{i+k} \right) y^k + \left(\sum_{i=0}^{|R_A|-1} s_i^2 \right) (y^{|R_A|} - 1) = \\ &= 2 \sum_{i=0}^{|R_A|-1} s_i \left(\sum_{k=0}^{|R_A|-1} s_{i+k} y^k \right) + \left(\sum_{i=0}^{|R_A|-1} s_i^2 \right) (y^{|R_A|} - 1) := \\ &:= 2 \sum_{i=0}^{|R_A|-1} s_i p_i(y) + \left(\sum_{i=0}^{|R_A|-1} s_i^2 \right) (y^{|R_A|} - 1) \end{aligned}$$

and recurrence

$$p_{i+1}(y) = \frac{p_i(y) - s_i}{y} + s_i y^{|R_A|-1}.$$

So, we calculate $p_{i+1}(y)$ from $p_i(y)$ taking $O(1)$ time and calculate $F(y)$ taking $O(|R_A|)$ time instead of $O(|R_A|^2)$ in summing by all pairs (i, k) .

Also we use form

$$2^{|R_A|+1} |R_A| F(1/2) \geq 2^{|R_A|} (4A^2 - A |R_A|)$$

of inequality (1) for calculate only natural numbers instead of fractions.