

Problemen

| Problem Section

Problem A (proposed by Hendrik Lenstra)

Prove that every commutative ring with identity having at most five ideals is a principal ideal ring.

Problem B (proposed by Gabriele Dalla Torre, inspired by the Dutch Mathematical Olympiad 2010)

Let $(a_n)_{n \geq 1}$ be a sequence of integers that satisfies

$$a_n = a_{n-1} - \min(a_{n-2}, a_{n-3})$$

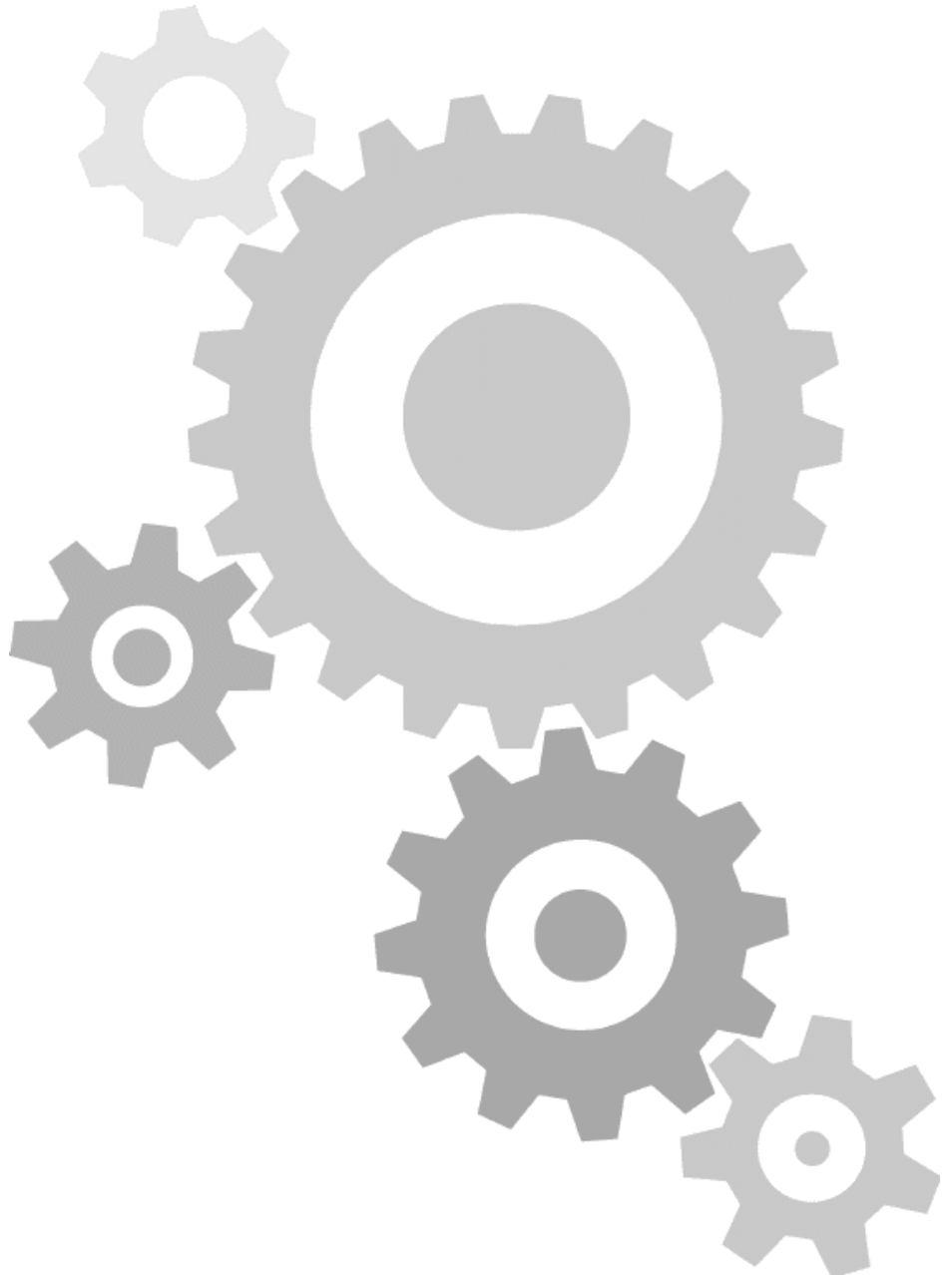
for all $n \geq 4$. Prove that for every positive integer k there is an n such that a_n is divisible by 3^k .

Problem C (proposed by Rik Bos)

Find all positive integers N, r, p with p prime that satisfy

$$\prod_{\ell \leq N} \ell = p(p^r + 1),$$

where the product runs over all primes ℓ not exceeding N .



Redactie:

Johan Bosman

Gabriele Dalla Torre

Ronald van Luijk

Lenny Taelman

Problemenrubriek NAW

Mathematisch Instituut

Universiteit Leiden

Postbus 9512

2300 RA Leiden

problems@nieuwarchief.nl

www.nieuwarchief.nl/problems