

Problemen

| Problem Section

Redactie:

Johan Bosman

Gabriele Dalla Torre

Christophe Debry

Jinbi Jin

Marco Streng

Wouter Zomervrucht

Problemenrubriek NAW

Mathematisch Instituut

Universiteit Leiden

Postbus 9512

2300 RA Leiden

problems@nieuwarchief.nl

www.nieuwarchief.nl/problems

Problem A (proposed by Hendrik Lenstra)

Let $a, b \in \mathbb{C}$. Show that if there exists an irreducible polynomial $f \in \mathbb{Q}[X]$ such that $f(a) = f(a+b) = f(a+2b) = 0$, then $b = 0$.

Problem B (The attribution will appear in the March issue of 2014)

Let n be a positive integer, and let e_{ij} be an integer for all $1 \leq j \leq i \leq n$. Show that there exists an $n \times n$ -matrix with integer entries such that the eigenvalues of the top left $i \times i$ -minor are e_{i1}, \dots, e_{ii} (with multiplicity).

Problem C (proposed by Bart de Smit and Hendrik Lenstra)

Let A be a finite commutative unital ring. Does there exist a pair (B, f) with B a finite commutative unital ring in which every ideal is principal, and f an injective ring homomorphism $A \rightarrow B$?

