# Problemen

| Problem Section

## Problem A

Let $f$ be a function from the set of positive integers to itself such that, for every $n$, the number of positive integer divisors of $n$ is equal to $f(f(n))$. For example, $f(f(6)) = 4$ and $f(f(25)) = 3$. Prove that if $p$ is prime then $f(p)$ is also prime.

## Problem B

Let $n$ be a positive integer and $F \subseteq 2^{[n]}$ a family of subsets of $[n] = \{1,2,\ldots,n\}$ that is closed under taking intersections. Suppose that

1. For every $A \in F$ we have: $|A|$ is not divisible by $3$.
2. For every pair $i,j \in [n]$ there is an $A \in F$ such that $i,j \in A$.

Show that $n$ is not divisible by $3$.

## Problem C* (proposed by Hendrik Lenstra)

Cut three squares of equal size in exactly the same way into three pieces each in such a way that the resulting nine pieces can be rearranged to form a regular twelve-gon. Open question: Can you cut the three squares into *eight* pieces that form a regular twelve-gon?

*Redacteur: Rob Eggermont*
*problems@nieuwarchief.nl*
*www.nieuwarchief.nl/problems*