Problemen

| Problem Section

Problem A (folklore)

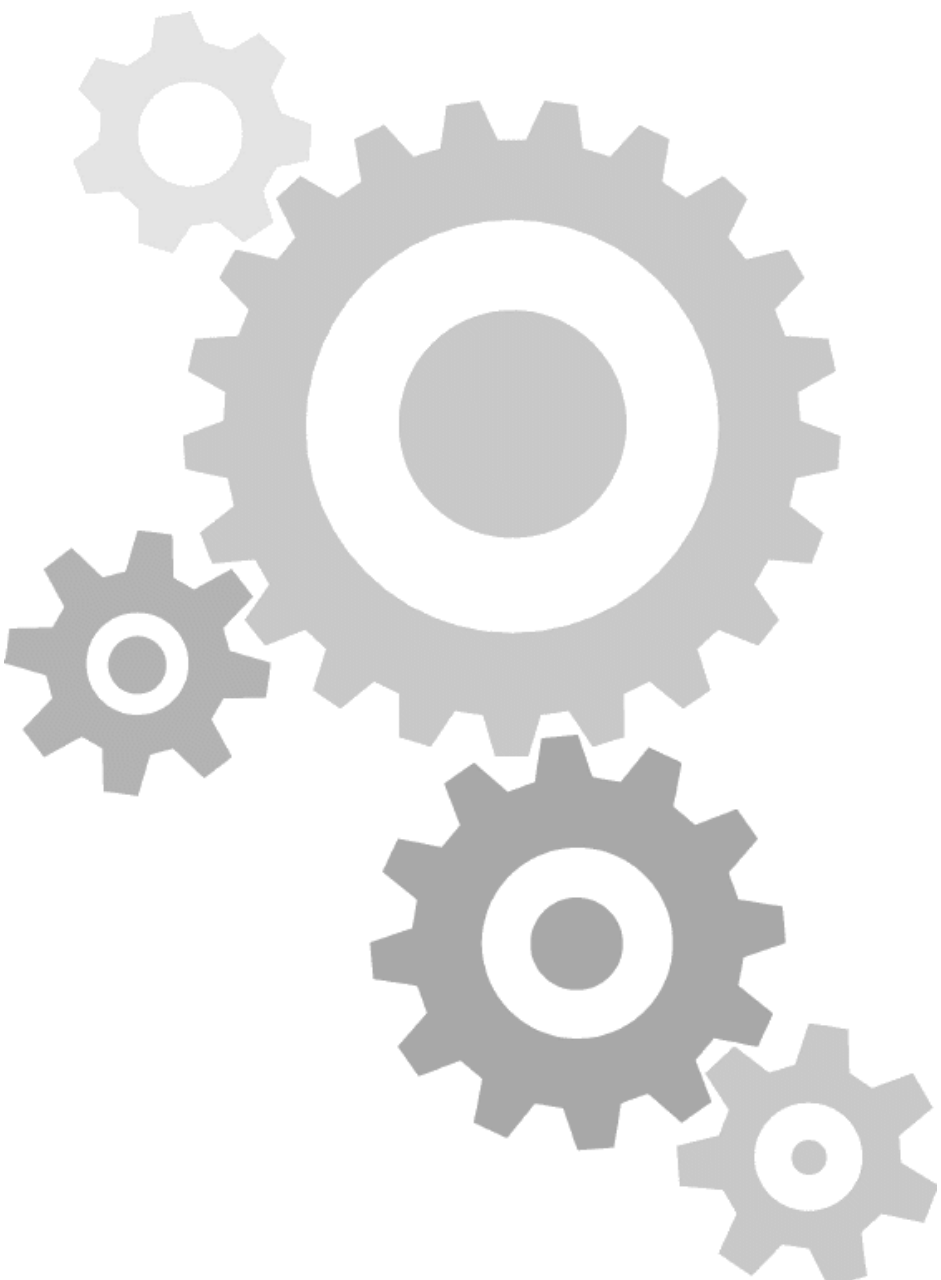
Let S be an open subset of $\mathbb{R}_{>0}$ that contains arbitrarily small elements. Prove that every positive real number can be written as a sum of finitely many elements of S.

Problem B (proposed by Gabriele Dalla Torre)

Let n be a positive integer. Show that every sequence of n elements of $\{0,\ldots,9\}$ occurs as a sequence of consecutive digits in the last $2n$ digits of the decimal representation of some power of 2. Also, determine all $\alpha \in \mathbb{R}_{>0}$ for which the statement still holds if we replace $2n$ by $\lceil \alpha n \rceil$.

Problem C (proposed by Pietro Vertechi)

Let p be a prime number. Determine the smallest integer d for which there is a monic polynomial f of degree d with integer coefficients such that p^{p+1} divides $f(n)$ for all integers n.



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