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13. Combinatorics

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On the conjectured subword complexity of the Kolakoski sequence

The *Kolakoski sequence* is the sequence K with values in $\{1, 2\}$ such that $K(n)$ is equal to the length of the nth run of equal symbols in K. Dekking conjectured in 1981 that its subword complexity function $p_K(n)$ was equivalent to Cn^ρ with $\rho = \log 3/\log(3/2)$. We prove, under the hypothesis that the set of subwords of K is invariant under the exchange of 1 and 2, that $p(n) \geq Cn^\rho$, and, under the additional hypothesis that 1 and 2 occur with the same frequency (which is a famous open problem), that $p(n) = O(n^{\rho+\epsilon})$ for any positive ϵ.