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Binary Words, n -Color Compositions and Bisection of the Fibonacci Numbers,
Fibonacci Quart. **51** (2013), no. 2, 130–136

Abstract

An n -color composition of n is a composition of n where a part k has k possible colors. It is known that the number of n -color compositions of n is F_{2n} (the $2n$ th Fibonacci numbers). Among other objects, F_{2n} also counts the number of binary words with exactly $n - 1$ strictly increasing runs and the number of $\{0, 1, 2\}$ strings of length $n - 1$ excluding the subword 12. In this note, we show bijections between n -color compositions and these objects. In particular, the bijection between the n -color compositions and the binary words with $n - 1$ increasing substrings generalizes the classic bijection between compositions and binary words of length $n - 1$. We also comment on the potential applications of these findings.