Abstract

An unexpected relationship is demonstrated between $n$-color compositions (compositions for which a part of size $n$ can take on $n$ colors) and part-products of ordinary compositions. As a consequence, we are able to use techniques developed for studying part-products to generalize the concept of $n$-color compositions to that of $S$-restricted $C$-color compositions, whose part-sizes are restricted to an arbitrary set $S$ of positive integers and for which a part of size $n$ can take on $c_n \in C = \{c_1, c_2, \ldots \}$ colors. We count the number of $S$-restricted $C$-color compositions and the number of $C$-color palindromic compositions, as well as the total number of parts in each setting. The celebrated Fibonacci numbers persist throughout.