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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 $\mathcal{C}$-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 $c_n \in \mathcal{C} = \{c_1, c_2, \ldots\}$ colors. We count the number of S-restricted $\mathcal{C}$-color compositions and the number of $\mathcal{C}$-color palindromic compositions, as well as the total number of parts in each setting. The celebrated Fibonacci numbers persist throughout.