
0866.05006

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Necklaces, MSS sequences, and DNA sequences. (English)

Adv. Appl. Math. 18, No.1, 18-32 (1997). [ISSN 0196-8858]
http://dx.doi.org/10.1006/aama.1996.0494

Based on a unified approach via the classical Burnside lemma in combinatorics, we deal with some problems arising from symbolic dynamics and biology. The MSS sequences play an important role in symbolic dynamics, and they are in one-to-one correspondence with necklaces of beads with two colors. This necklace problem was studied by Fine, Gilbert, and Riordan in the 1950s and 1960s. Recently, a problem on the classification of the DNA sequence arose in biology and was studied by Bell, Torney, and others. In this paper, we present a further treatment of the necklace problem which shows a closer connection with MSS sequences and brings more combinatorial insight into the properties of symbolic dynamics. We also give a clear derivation of the formula for the classification of DNA sequences. The techniques used in this paper originate principally from properties of cycle structures, which are related to the fixed points of the n-cube recently studied by Chen and Stanley.

Keywords : symbolic dynamics; necklaces; DNA sequence; MSS sequences
Classification :
∗05A15 Combinatorial enumeration problems
37E99 Low-dimensional dynamical systems
92D20 Protein sequences, DNA sequences

Cited in ...