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Permutations and β -shifts. Preliminary report.

Given a real number $\beta > 1$, a permutation π of length n is realized by the β -shift if there is some $x \in [0, 1]$ such that the relative order of the sequence $x, f(x), \dots, f^{n-1}(x)$, where $f(x)$ is the fractional part of βx , is the same as that of the entries of π . Shifts are important dynamical systems because they exhibit some key features of low-dimensional chaos. Permutations realized by shifts when β is an integer have recently been characterized. We generalize some of these results to arbitrary β -shifts, by describing a method to compute, for any given permutation π , the smallest β such that π is realized by the β -shift. We also give a way to determine the length of the shortest forbidden pattern of an arbitrary β -shift. (Received July 30, 2010)