

1077-05-2172

David S Rolnick* (drolnick@mit.edu). *On the Classification of Stanley Sequences.*

An integer sequence is said to be *3-free* if no three elements form an arithmetic progression. The *Stanley sequence* $S(a_0, a_1, \dots, a_k)$ is the greedily-derived 3-free sequence $\{a_n\}$ having initial terms a_0, a_1, \dots, a_k and with each subsequent term $a_n > a_{n-1}$ chosen minimally such that the 3-free condition is not violated. Odlyzko and Stanley conjectured that Stanley sequences divide into two classes based on asymptotic growth patterns, with one class of highly structured sequences satisfying $a_n \approx O(n^{\log_2 3})$ and another class of seemingly chaotic sequences obeying $a_n = O(n^2/\log n)$. We propose a rigorous definition of *regularity* in Stanley sequences based on local structure rather than asymptotic behavior and show that our definition implies the corresponding asymptotic property proposed by Odlyzko and Stanley. We then construct many classes of regular Stanley sequences, which include as special cases all such sequences previously identified. Finally, we show that certain Stanley sequences possess proper subsets which are also Stanley sequences, a situation which prior authors seem tacitly to have assumed impossible. (Received September 21, 2011)