

DYNAMIC ONE-PILE NIM

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Abstract

The purpose of this paper is to solve a class of combinatorial games consisting of one-pile counter pickup games for which the maximum number of counters that can be removed on each successive move changes during the play of the game. Two players alternate removing a positive number of counters from the pile. An ordered pair (N, x) of positive integers is called a *position*. The number N represents the size of the pile of counters and x represents the greatest number of counters that can be removed on the next move. A function $f : Z^+ \rightarrow Z^+$ is given which determines the maximum size of the next move in terms of the current move. Thus a *move* in a game is an ordered pair of positions $(N, x) \mapsto (N - k, f(k))$, where $1 \leq k \leq \min\{N, x\}$. The game ends when there are no counters left, and the winner is the last player to move in the game. This paper extends two papers, one by Epp and Ferguson[2], and the other by Schwenk[6].