

THREE PILE NIM WITH BLOCKING

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Abstract

Nim, also known as Bouton's Nim, is a two player counter pickup game that is well-known in combinatorial game theory. In this paper we develop a winning strategy for a more complicated variation of nim in which certain moves can be blocked. Remarkably, the winning strategy for the more complicated version is much simpler than for ordinary nim. Specifically, we explore a three pile game with two players, a moving player and a blocking player whose roles alternate between moves. Before each move, including the first move, the blocking player must eliminate exactly one move of the moving player's possible moves. For example, if the moving player is confronted with piles of size 6, 10, and 10, denoted here by $(6, 10, 10)$, the blocking player could forbid the move to $(6, 3, 10)$; that is, the blocking player could forbid the removal of 7 counters from the first of the two 10 counter piles. As in nim, a move consists of the removal of any number of counters from any single pile. The winner is the last player to make an allowed move.