The combinatorial game theory of Reverse Hex

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Rex, short for Reverse Hex, is a set coloring game in which players try to avoid connecting terminals of their color. Combinatorial game theory (CGT) is the study of perfect strategy games. Until recently, both Rex and Hex were not examined through the lens of CGT. In this thesis we take inspiration from the study of normal play games by Berlekamp, Conway, and Guy, along with the combinatorial game theory of Hex developed by Selinger, to develop methods for analyzing Rex positions. We explore how to tell if one position is preferable to another, how to simplify positions, and some special properties of Rex (and antimonotone set coloring games in general). By the end of this thesis we will be able to take a position in a game of Rex, break it into smaller positions, analyze each of the smaller positions, then add the results back together to more easily determine who wins and loses the larger position.