

The Edge Delete Game on Graphs

Douglas Rall
Department of Mathematics
Furman University

Abstract

Two players take turns removing an edge from a graph G (with no isolates) so that no isolated vertex is created. The winner of the game, called the *Edge Delete Game*, is the last player who can remove such an edge. For any graph G with no isolated vertices there is a winning strategy for one of the two players. If the first (respectively, second) player has a winning strategy when the Edge Delete Game is played on G , then G is called a *Player 1* (respectively, *Player 2*) graph. For some graphs the winner is predetermined, independently of how the two players proceed so long as they follow the rules. For example, this edge deletion game played on the cycle of order seven always ends after three moves and so will be won by the first player without following any particular strategy. However, if the game is played on the cycle of order six, then play can terminate after either two or three moves, but there is a winning strategy for the second player. That is, C_7 is a Player 1 graph, and C_6 is a Player 2 graph.

In this talk we consider many examples and derive some properties of a connected graph G that are sufficient for G to be a Player 1 (respectively, Player 2) graph. In addition, we characterize the paths that are Player 2 graphs and prove a structural characterization of the class of connected graphs of girth at least five for which the edge deletion game always ends in the same number of moves.

This talk concerns joint work with Rob Gallant & Georg Gunther from Newfoundland, and Bert Hartnell from Nova Scotia.