

1077-05-2226

Teresa W. Haynes* (haynes@etsu.edu), Department of Mathematics and Statistics, East Tennessee State University, Johnson City, TN 37614. *Two Conjectures Involving Diameter and Total Domination in Graphs.*

We present two intriguing conjectures involving diameter and total domination in graphs. A graph G is diameter 2-critical if its diameter is two, and the deletion of any edge increases the diameter. Murty and Simon conjectured that the number of edges in a diameter 2-critical graph of order n is at most $n^2/4$ and that the extremal graphs are complete bipartite graphs with equal size partite sets. This conjecture has an equivalent form based on a seemingly disparate concept, namely, total domination critical graphs. A graph is total domination critical if the addition of any edge decreases the total domination number. Using this important association with total domination, we have proven the equivalent form of the Murty-Simon Conjecture for graphs whose complements have specified properties. We discuss these results and outline the progress made toward a solution. We conclude the talk by giving a recently posed conjecture that the total domination number of any diameter-2 graph of order n is at most $\sqrt{n} + 1$. We discuss the motivation of this conjecture and list characteristics of any potential counterexample. Results mentioned in this talk are from varying subsets of the following co-authors: Wyatt Desormeaux, Michael Henning, Lucas van der Merwe, and Anders Yeo. (Received September 21, 2011)