

# THEORY OF DOMINATION IN GRAPHS AND HYPERGRAPHS (PART 2)

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**Background.** Dr Nader Jafari Rad is a Professor of Mathematics and the head of the Department of Computer Science at Shahed University, Tehran, Iran. He received his PhD degree in Mathematics in the area of Graph Theory and Combinatorics from University of Mazandaran, Iran, in 2007. He started his career at Department of Mathematics, Shahrood University of Technology (SUT), Iran as an Assistant Professor. Prof. Nader then joined the Algorithms and Computations Group at Institute for Research in Fundamental Sciences (IPM), Iran in 2009 as a researcher. After working for 11 years at SUT, he moved to Shahed University, Iran in 2018. He has supervised 48 master students and 12 PhD students in different universities. He was appointed as an Academic Fellow of School of Mathematical Sciences, Universiti Sains Malaysia in 2021. He has worked on several topics such as extremal graph theory and Ramsey theory, algebraic graph theory, coding theory, and algorithms and complexity. His main research interests are domination theory in graphs and hypergraphs. To date, he has published more than 170 papers in Mathematics journals and two Springer Book-Chapters. He has collaborated with mathematicians from various countries, including Algeria, Canada, China, France, Germany, Poland, Spain and the United States.

**Abstract.** A total dominating set of a graph  $G$  with no isolated vertices is a set  $S$  of vertices of  $G$  such that every vertex of  $G$  is adjacent to at least one vertex of  $S$ . A transversal of a hypergraph  $H$  is a set  $T$  of vertices of  $H$  such that  $T$  has a nonempty intersection with every edge of  $H$ . This talk, as the second talk on the Theory of Domination in Graphs and Hypergraphs, will focus on the concept of total dominating sets in graphs and transversals in hypergraphs. There are many bounds of the total domination number of a graph in terms of different graph variants. It is proven that the total domination number of any tree is equal to the open packing number of the tree. The transversal number of the open neighborhood hypergraph of any isolated-free graph is equal to the total domination number of the graph and by using this fact, several improved bounds for the transversal number of uniform hypergraphs as well as the total domination number of graphs have been obtained. There are several types of total dominating sets in graphs. These types are based on certain properties that are satisfied by the total dominating set. At the end of this talk, we will see several open problems and conjectures on the total domination number of a graph.

Date: 4 October 2021 (Monday)

Time: 2:30-3:30 PM (Malaysia time)

Link: <https://bit.ly/2Wof5Td> (Via Microsoft Teams)



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