Nordhaus-Gaddum type inequalities

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Let G be a graph, the complement G' of G is the graph which has the same set of vertices as G, but a pair of vertices are only adjacent in G' if and only if they are not in G. Inequalities that relate the sum or product of an invariant of a graph and its complement are usually referred to as Nordhaus-Gaddum type results.

A Nordhaus-Gaddum type problem usually requires more efforts than a simple extremal problems, since if a graph has a large value of the underlined invariants, its complement might have the opposite. In this project, we will investigate techniques used to prove those inequalities for well-know invariants such as the chromatic number and/or the domination number in graphs. We will explore as well the "sharpness" of those bounds. Lastly, we will adapt those techniques to more recent parameters such as the number of subtrees and the average independent sets or matchings in graphs.