Some new upper bounds on the number of maximum independent sets of a graph

Vadim E. Levit*, Elizabeth J. Itskovich, Ariel University

An *independent set* in a graph has no vertices adjacent to each other, while in a *clique* all pairs of different vertices are adjacent. Given a graph G, the number of its vertices is $n(G)$, the cardinality of its maximum independent set is $\alpha(G)$, the size of its largest clique is $\omega(G)$, and the cardinality of the intersection of all maximum independent sets is $\xi(G)$.
One of our new upper bounds on the number of maximum independent sets $s_\alpha(G)$ reads as follows:

$$s_\alpha(G) < \omega(G) \cdot 2^{n(G)-\alpha(G)-\omega(G)-\xi(G)+1}$$

Given a sequence of integers, as an application of our general findings, we present a series of inequalities connecting the number of longest increasing subsequences with the number of longest decreasing subsequences.

Keywords: independent set, clique, core, permutation graph