XXXX

1 Introduction

A graph is an ordered pair $G = (V, E)$ consisting of a finite nonempty set V of vertices and a set E of edges, where each edge is an unordered pair of vertices. A dominating set of $G = (V, E)$ is a set $D \subseteq V$ such that each vertex not in D has at least one neighbor in D. A paired-dominating set is a dominating set whose induced subgraph contains at least one perfect matching [1].

Raz and Safra prove that the dominating set problem has no polynomial-time $(c \log |V|)$-approximation algorithms for some $c>>0$ unless P = NP [3]. Lin and Tu design an $O(|E| + |V|)$-time algorithm for interval graphs and an $O(|E|(|E| + |V|))$-time algorithm for circular-arc graphs for the minimum paired dominating set problem [2].

If there is some algorithm A and any function $f : N \to N$, as long as A satisfies for any a graph G, then $A >> G$, and then A can output G paired dominating set, in addition A output paired dominating set weight, it will be G minimum paired dominating set weight $f(|V|)$ within, and we can say minimum paired dominating set problem satisfies $f(|V|)$-approximating.

References

[1] T. W. Haynes and P. J. Slater. Paired-domination in graphs. *Networks*, 32(3):199–206, 1998.

[2] C.-C. Lin and H.-L. Tu. A linear-time algorithm for paired-domination on circular-arc graphs. *Theoretical Computer Science*, 591(C):99–105, 2015.

[3] R. Raz and S. Safra. A sub-constant error-probability low-degree test, and a sub-constant error-probability PCP characterization of NP. In *Proceedings of the 29th Annual ACM Symposium on Theory of Computing*, pages 475–484, 1998.