

On the extremal Harary index of graphs with given parameters

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Abstract. Let $G = (V(G), E(G))$ be a graph with vertex set $V(G)$ and edge set $E(G)$. The distance $d(u, v)$ between any two distinct vertices $u, v \in V(G)$ is the number of edges in a shortest path joining u and v . The *diameter* of a graph G is the maximum distance between any two vertices in G . A subset $S \subset V(G)$ of mutually non-adjacent vertices in a graph G is said to be an *independent set* in G . The *independence number* is the maximum cardinality of an independent set in G .

The *Harary index* of a graph G , denoted by $H(G)$, was introduced in 1993, and is defined as

$$H(G) = \sum_{u, v \in V(G)} \frac{1}{d_G(u, v)}, \quad (1)$$

with the summation going over all pairs of vertices of G . This index was named in honor of Professor Frank Harary on the occasion of his 70th birthday. Recently, there has been a great interest in studying extremal graphs that minimize (or maximize) Harary index in different classes of graph. The graphs with diameter or independence number equal to $n - c$, for $1 \leq c \leq 4$, which attain the minimum value with respect to the Harary index are being considered and the extremal graphs are characterized, as well.

Keywords: Harary index; diameter; independence number.

References

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