On Friendly Index Set of Hypercube Q_n

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For a graph $G = (V, E)$, a binary vertex labeling (coloring) $f\colon V(G) \to \mathbb{Z}_2$, is said to be friendly if the number of vertices labeled 0 is almost the same as the number of vertices labeled 1. The friendly labeling $f\colon V(G) \to \mathbb{Z}_2$ induces an edge labeling $f_*\colon E(G) \to \mathbb{Z}_2$ defined by $f_*(xy) = |f(x) - f(y)|$ $\forall xy \in E(G)$. Let $e_f(i) = |{f_*}^{-1}(i)|$ be the number of edges labeled i. The friendly index set (or cordial set) of the graph G, denoted by $C(G)$, is defined by

$$C(G) = \{\, |e_f(1) - e_f(0)| : f \text{ is a friendly vertex labeling of } G \,\}.$$

In this talk, among other facts, we investigate the friendly index set of n-cubes Q_n and improve the conjecture that is already stated in this regard. In addition, without computer aid, we completely determine the friendly index sets of Q_n for $n \leq 6$.