A Formal Construction of any Clifford Graph Algebra and Relationships Between Generators of its Different Bases

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A Clifford graph algebra $GA(G)$ of a simple graph G with n vertices associates each of its n generators with one of the vertices of G such that any two generators anti-commute or commute depending on whether their corresponding vertices share or do not share an edge.

In recent talks we developed these algebras for some classes of graphs by selecting a special set of generators from a basis for a classical Clifford algebra. These constructions prompt the question as to whether or not $GA(G)$ will always exist. In this talk we will prove this conjecture by constructing the Clifford graph algebra for any simple finite graph G, wherein each monomial in the basis for $GA(G)$ is a Kronecker delta defined on sequences of vectors from an orthonormal basis for $\mathbb{R}^n$.

We will explore the extent to which a different orthonormal basis for $\mathbb{R}^n$ can produce generators which depict the same algebra $GA(G)$ relative to the basis for $\mathbb{R}^n$ used to construct $GA(G)$ in the case where G is neither complete nor empty.

Keywords : Clifford algebra, Kronecker delta, orthonormal basis.