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SYSTEMS OF ORTHOGONAL DESIGNS AND QUASI CLIFFORD ALGEBRAS

H.M. GASTINEAU-HILLS

There are three parts.

The first part (on orthogonal designs and systems of orthogonal designs) outlines some orthogonal design theory. It is recalled that the theory of Clifford Algebras may be used to relate the possible orders of amicable pairs of orthogonal designs to the numbers of variables involved. A similar approach to the problem of relating order to numbers of variables for more complex constructs (such as amicable triples and product designs) leads to generalizations of Clifford Algebras.

The concept of a *System of Orthogonal Designs* is introduced, encompassing many concepts which have proved useful in constructing new orthogonal designs - concepts such as amicable sets, product designs and repeat designs. This wider concept makes it possible to unify and generalize in a single theorem many of the construction methods found in the literature. The problem of relating order to numbers of variables for such general systems leads to the introduction of *Quasi Clifford Algebras*.

The second part (on the structure and representations of Quasi Clifford Algebras) contains a formal treatment of Quasi Clifford Algebras. Sufficient generality is taken so that the Clifford Algebras of arbitrary non-singular quadratic forms over arbitrary fields (characteristic not two) are contained as a subclass. Decisive structure theorems are proved.

The third part (on the orders of systems of orthogonal designs) applies the theory of Quasi Clifford Algebras to solve the problem of

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relating orders to numbers of variables for arbitrary systems. The solution in the cases of amicable sets, product designs and repeat designs are explicitly found.

Department of Pure Mathematics,
University of Sydney,
Sydney,
New South Wales 2006,
Australia.

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