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Embedding orthogonal partial Latin squares

In 1960, Evans proved that a partial Latin square of order n can always be embedded in some Latin square of order t for every $t \geq 2n$ and asked if a pair of finite partial Latin squares which are orthogonal can be embedded in a pair of finite orthogonal Latin squares. It is known, that a pair of orthogonal Latin squares of order n can be embedded in a pair of orthogonal Latin squares of order t if $t \geq 3n$, the bound of $3n$ being best possible. Jenkins, considered embedding a single partial Latin square in a Latin square which has an orthogonal mate. His embedding was of order t^2. In 2014, the first constructive polynomial embedding result for a pair of orthogonal partial Latin squares was given. Recently, the work of Jenkins is generalized and it is shown that any partial Latin square can be embedded in a Latin square which has many orthogonal mates (not just one) that are mutually orthogonal. In this talk, we review results for the embedding of orthogonal partial Latin squares in orthogonal Latin squares, comparing and contrasting these with results for embedding partial Latin squares in Latin squares. We also present a new construction that uses the existence of a set of t mutually orthogonal Latin squares of order n to construct a set of $2t$ mutually orthogonal Latin squares of order n^t.