3. J. Rauch and M. E. Taylor, *Penetrations into shadow regions and unique continuation properties in hyperbolic mixed problems*, Indiana Univ. Math. J. **22** (1972/73), 277–285. MR **46** #2240.

JEFFREY RAUCH

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Latin squares and their applications, by J. Dénes and A. D. Keedwell, Academic Press, New York, 1974, 547 pp., $24.50.

A *latin square* $A=[a_{ij}]$ of order n is an $n\times n$ array in which the places are occupied by elements from an n-element set and each element from the set occurs exactly once in each row and column. They are familiar objects in algebra as multiplication tables of quasigroups, in geometry as coordinate systems for nets, and in statistics where, as one of the simplest combinatorial designs, they are used extensively in the design of experiments.

This is the first book devoted entirely to latin squares. While the statistical, algebraic and geometric aspects are discussed, the major theme is the construction of orthogonal sets of latin squares. This is not surprising since much of the current interest in latin squares was stimulated by the disposal in the late 1950's of a famous conjecture of Euler's. Two $n\times n$ latin squares $A=[a_{ij}]$, $B=[b_{ij}]$ are *orthogonal* if, when B is superimposed on A, the n^2 ordered pairs (a_{ij}, b_{ij}) contain each pair exactly once. Euler's *Officers Problem* concerns the existence of a 6×6 array of 36 officers, 6 of each rank, from 6 different regiments, such that there is, in each row and in each column, exactly one officer of each rank and one officer from each regiment. This is obviously equivalent to the existence of two orthogonal latin squares of order six. Euler was able to construct a pair of orthogonal latin squares for all orders n other than $n\equiv 2 \pmod 4$ and he conjectured that for these orders no such pair exists. That Euler's conjecture is true for $n=6$ was verified by Tarry in 1900. It was not until 1958–1960 that the combined efforts of Bose, Shrikhande and Parker showed that Euler was wrong in all other cases.

At about the same time, another well-known conjecture was disposed of by Parker. Macneish in 1922 conjectured that if $n=p_1^{i_1}p_2^{i_2}\cdots p_m^{i_m}$ (p_i distinct primes) then the maximal size of a set of mutually orthogonal latin squares (m.o.l.s.) is $(\min p_j^{p_j})-1$. This conjecture is based on the construction of a set of p^i-1 m.o.l.s. from a finite field of order p^i. By a direct product construction we can obtain from t m.o.l.s. of order n_1 and t m.o.l.s. of order n_2, a set of t m.o.l.s. of order n_1n_2. Thus, for $n=p_1^{i_1}p_2^{i_2}\cdots p_m^{i_m}$, there is a set of at least $(\min p_j^{i_j})-1$ m.o.l.s. Macneish conjectured that there were exactly this many. However, Parker constructed a set of 4 m.o.l.s. of order 21. More recently, sets of 5 m.o.l.s. of order 12 have been constructed. Since we now know that there do exist sets of m.o.l.s. for all $n>6$, interest has shifted to the question of the maximal size of such sets. We know that the number tends to infinity