Uncleft rings are extensions of cleft rings, and the study of extensions naturally starts with inseparable fields. (Received April 1, 1944.)

119. John Williamson: *Hadamard's determinant theorem and the sum of four squares.*

A square matrix H of order n is called an Hadamard or an H-matrix (Jacques Hadamard, *Résolution d'une question relative aux déterminants*, Bull. Sci. Math. (2) vol. 17 (1893) Part I, pp. 240–246) if each element of H has the value ± 1 and if $|H|$ has the maximum possible value $n^{n/2}$. In the first part by an adaptation of methods used by R. E. A. C. Paley, *On orthogonal matrices*, Journal of Mathematics and Physics, Massachusetts Institute of Technology, vol. 12 (1933) pp. 311–320, it is shown that: (1) if there exists an H-matrix of order $m>1$, there exists an H-matrix of order $m(p^h+1)$ where p is an odd prime, and (2) there exists an H-matrix of order $N(N-1)$ where $N=2^t k_1 k_2, \cdots, k_r$ and $k_i = p_i^{h_i}+1 \equiv 0 \bmod 4$, p_i an odd prime. In the second part it is shown that an H-matrix of order $4n$ exists if there exist four polynomials $A_i(x)=\sum_{j=0}^{n-1} a_{ij}x^j$, $i=1, 2, 3, 4$, satisfying the following conditions: $a_{ij}=a_{i,n-j}=\pm 1$, $\sum_{i=1}^{4}(A_i(\omega))^2=4n$ for every nth root ω of unity. Such polynomials $A_i(x)$ are determined for specific small values of n and in particular for $n=43$ thus showing the existence of an H-matrix of order 172, a result not previously known. (Received March 22, 1944.)

Analysis

120. R. P. Agnew: *Summability of subsequences.*

If A is a regular (real or complex) matrix method of summability and x_n is a bounded complex sequence, then there exists a subsequence y_n of x_n such that the set L_Y of limit points of the transform Y_n of y_n includes the set L_x of limit points of the sequence x_n. (Received February 2, 1944.)

121. E. F. Beckenbach and Maxwell Reade: *Further results on mean-values and harmonic polynomials.*

In this paper the authors study the relation between the "vertex averages" used by Walsh (J. L. Walsh, Bull. Amer. Math. Soc. vol. 42 (1936) pp. 923–930) and the "peripheral" and "areal averages" used by Beckenbach and Reade (E. F. Beckenbach and Maxwell Reade, Trans. Amer. Math. Soc. vol. 53 (1943) pp. 230–238). From the relation noted it follows that some of the results of Walsh are equivalent to those obtained by Beckenbach and Reade, and moreover, by following the methods outlined by the latter authors, it is possible to extend Walsh's results to more general "vertex averages." (Received March 27, 1944.)

122. E. F. Beckenbach and Maxwell Reade: *Regular solids and harmonic polynomials.*

Suppose D is a domain containing a regular solid V_0 and ϕ is a class of functions $f(x, y, z)$ defined and continuous on D. It is assumed that if V is similar and parallel to V_0 then the value of $F(x, y, z)$ at the center of V is the mean of values of $f(x, y, z)$ at the vertices. The class ϕ is shown to consist of certain harmonic polynomials. For the five regular solids these classes are given in terms of three spherical harmonics and their partial derivatives. The solution of the problem, suggested by J. L. Walsh (Bull. Amer. Math. Soc. vol. 42 (1936) pp. 923–930), of determining the class of