May Meeting of the Indiana Section

P. T. Mielke (Secretary)

6. *Repeated quadrature methods for the numerical solution of differential equations,* by L. D. Gates, Jr., Southern Illinois University.

A one-step method for numerical solution of differential equations uses a first order difference equation in place of a first order differential equation, the best known being the Runge-Kutta methods. A new family, the methods of repeated quadratures, is described. A method having order of accuracy n is obtained by using a quadrature formula of nth order accuracy with one-step methods whose accuracy is at least of order $n-1$. The methods of repeated quadrature are much easier to derive than the Runge-Kutta methods, and are somewhat better with respect to error propagation at the cost of being less efficient in computing time.

7. *Groups with nilpotent commutator subgroup,* by E. E. Shult, Southern Illinois University.
The following results are presented:

(a) Let V be a group of order pq acting as a fixed-point-free group of automorphisms on a solvable group G. If pq does not divide $o(G)$, the order of G, and if neither p nor q are Fermat primes when $o(G)$ is even, then G has nilpotent length at most 2.

(b) If, in (a), V is the symmetric group S_3, then G has nilpotent commutator subgroup.

(c) Let V be a solvable group with the property that whenever V is a fixed-point-free group of operators on a solvable group, G, for which $(o(G), o(V)) = 1$, G' is nilpotent. Then V is either cyclic of prime order, has order 4, or is S_3.

ARNOLD WENDT, *Secretary*

MAY MEETING OF THE INDIANA SECTION

The spring meeting of the Indiana Section of the MAA was held on Saturday, May 2, 1964, at Butler University, Indianapolis. Ninety-eight persons attended of whom 60 were members of the Association. Chairman Harley Flanders of Purdue University presided. The meeting consisted of a symposium on *Probability and Statistics*. Discussions centered around the following hour lectures:

1. *The Zero-One laws of probability theory,* by D. L. Burkholder, University of Illinois.

2. *The statistical basis of decision under uncertainty,* by Leo Katz, Michigan State University.

3. *Industrial applications of quality control statistics,* by Irving W. Burr, Purdue University.

4. *Statistical inference in a problem of disputed authorship,* by D. L. Wallace, University of Chicago.

The authorship referred to is that of the *Federalist Papers*. This lecture has been published under the title "Inference in an Authorship Problem" in the Journal of the American Statistical Association, 58 (1963) 275–309.

The meeting also included a period for discussion of the role of the Section in high school contests. In the past, two types of contest have been held in the state, that of the Mathematical Association of America and a special contest sponsored by Indiana University. A crisis has been created by the recent decision of Indiana University to discontinue its contest, which had enjoyed considerable popularity, especially for use at the more elementary levels. Several school teachers expressed the opinion that the MAA contest cannot fill the void thus created and that a new contest is needed to replace the Indiana University contest. The question considered was whether the Section should assume the responsibility for this new contest. There was general agreement that it should not, since by so doing it would be putting itself in competition with its national parent organization. It was the consensus rather that the Section should actively encourage state schools to use the MAA contest and also to seek means within the MAA for giving the contest wider appeal.

At the business meeting there was a discussion of the Visiting Lecturer Program of

the Indiana Academy of Science by Prof. W. G. Kessel of Indiana State College, director of the program.

Officers elected for the coming year are: R. E. Dowds, Butler University, Chairman; Robert Troyer, Indiana University, Vice-Chairman; and Paul Mielke, Wabash College, Secretary-Treasurer.

P. T. MIELKE, *Secretary*

MAY MEETING OF THE KENTUCKY SECTION

The Kentucky Section of the MAA met May 1–2, 1964 at the University of Kentucky, Lexington, Kentucky. Professor J. C. Eaves, Chairman of the Section, presided. The first session dealt with mathematical education. Participants in this program were Professor J. C. Eaves, University of Kentucky, Chairman of the Kentucky Section; Dr. Sidney Simandle, Kentucky State Department of Education; Dr. Allan Anderson, Western Kentucky State College; Professor Alvin McGlasson, Eastern Kentucky State College; Brother Edward Daniel, St. Xavier High School; Dr. T. J. Pignani, University of Kentucky and Dr. Leland Scott, University of Louisville.

The following officers were elected for the coming year: Chairman R. S. Park, Eastern Kentucky State College; Secretary-Treasurer, W. C. Royster, University of Kentucky.

Papers presented at the second session were:

1. *Finite difference formulae for the Laplacian operator*, by W. S. Krogdahl, University of Kentucky.

For the purposes of numerical computation, the Laplacian operator is customarily given by some suitable finite difference operator. Such operators are generally represented by symmetric stencils which represent the array of coefficients of the values of the function at the points of a square grid. These stencils are not unique. It was shown how suitable stencils might be generated and a method was suggested for eliminating the ambiguity in a systematic way.

2. *Restricted convergence of multiple series*, by Henry Spragens, University of Louisville.

A discussion of various schemes for summing multiple series was given along with several examples.

3. *Quasi-conformal mappings by the Grotzsch definition*, by Harold Robertson, University of Kentucky.

An expository talk on the Grotzsch definition and quasi-conformal mappings was given. A generalization of the Schwarz lemma was obtained for K-quasi-conformal mappings.

4. *Simple applications of functional analysis*, by Casper Goffman, Purdue University (by invitation).

Two examples, one concerning summability and one concerning universal series, were used to indicate how functional analysis can be applied to give simple and precise results in analysis.

5. *Remarks on product integrals*, by Raymond Cox, University of Kentucky.

The notion of a *product integral* for a function A, from the real line to a set of $n \times n$ matrices, was discussed.

In particular, necessary and sufficient conditions on A were given to insure the existence of the product integral; and several properties of the integral, such as its plane series expansion, were given.

6. *On matrix representation of cubic forms*, by J. C. Eaves, University of Kentucky.

The multiplication of matrices is extended to include three dimensional matrices in such a way that the expression for the general cubic in n variables is given as a product of matrices, one of which is of dimension $n \times n \times n$.

W. C. ROYSTER, *Secretary*