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## The May Meeting of the Indiana Section

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which affords a means for obtaining the complementary function of a second order linear differential equation with constant coefficients and imaginary "roots" without resorting to Euler's expression for  $e^{ib}$ .

4. *Concerning metamathematics and Gödel's theorem*, by Mr. F. C. DeSua, University of Pittsburgh, introduced by the Secretary.

An exposition of some methods and results in metamathematics was presented. Results were stated informally without proof although heuristic accounts were given of Gödel's theorem and of Post's proof of the consistency of the propositional calculus.

5. *Some functions related to harmonic functions*, by Professor I. M. Sheffer, The Pennsylvania State College.

Let  $u(x, y)$  be an analytic function of the real variables  $x, y$  and such that the power series for  $u$  and all its derivatives converge in and on a fixed circle  $C$ . There exist such functions  $u$  that are non-harmonic and such that  $u$  and all its derivatives satisfy the Gauss mean value theorem for this one circle  $C$ . Properties of these functions are examined. In particular, they satisfy a linear, homogeneous partial differential equation of infinite order in the Laplacian  $\Delta u$ , with constant coefficients.

6. *Exterior forms in Hilbert space*, by Professor T. T. Tanimoto, Allegheny College.

A Grassmann algebra of multilinear mapping in Hilbert space is constructed and a few applications are given.

7. *On finding the characteristic equation of a square matrix*, by Mr. W. Berger and Professor E. A. Saibel, Carnegie Institute of Technology, presented by Mr. Berger.

Using the elementary operations which leave the characteristic equation of the matrix unchanged, it is always possible to transform the matrix such that there is an array of zeros in the lower left-hand corner below the sub-diagonal. Using the Cayley-Hamilton theorem and post-multiplying by the column matrix  $\{1, 0, 0, \dots, 0\}$ , a triangular set of equations in the coefficients of the characteristic equation results.

8. *The minimum essentials of a required course in mathematics for business majors*, by Professor Mary A. Goins, Marshall College.

The need for an adequate course in mathematics for students in business curricula prompted this study. A questionnaire containing twenty topics thought to be fairly representative of the minimum content of a reasonably adequate required course in mathematics for business students, with space provided for other suggested topics, was sent to the deans of forty-five professional schools of business in Colorado, Florida, Louisiana, Maryland, Michigan, Oregon, and Texas. The replies were tabulated and analyzed with reference to each curriculum. The final analysis showed that the topics mentioned more than fifty percent of times in all curricula might be taught adequately in a three semester-hour course. If six semester-hours were given to the subject, the topics which were required by all of the schools in all curricula could be taught thoroughly.

F. H. STEEN, *Secretary*

#### THE MAY MEETING OF THE INDIANA SECTION

The thirtieth annual meeting of the Indiana Section of the Mathematical Association of America was held jointly with the Indiana Council of Teachers

of Mathematics at Ball State Teachers College, Muncie, Indiana, on May 1 and 2, 1953. A dinner meeting on Friday evening was addressed by Professor R. E. Langer of the University of Wisconsin on the topic, "Teaching—a job or a profession."

Professor C. P. Sousley, Vice-Chairman of the Indiana Section of the Association, presided at the general session and at the sectional meetings of the Association on Saturday. The general session was devoted to a panel discussion on the academic training of secondary school teachers of mathematics. Professor P. D. Edwards, Head of the Mathematics Department of Ball State Teachers College, acted as moderator, and members of the panel were Professor W. L. Ayres, Dean of the School of Science, Purdue University, Professor Philip Peak of the School of Education, Indiana University, and Mr. R. O. Virts, Chairman of the Mathematics Department and Vice-Principal, Central High School, Fort Wayne, Indiana. The discussion was summed up by Professor R. E. Langer of the University of Wisconsin.

A sectional meeting of the Association devoted to short papers followed the general session in the morning and was continued following the business meeting in the afternoon.

There were one hundred eighteen in attendance including the following thirty-nine members of the Association:

H. W. Alexander, W. L. Ayres, Juna L. Beal, Stanley Bolks, C. F. Brumfiel, W. W. Chambers, K. W. Crain, H. E. Crull, D. E. Deal, M. W. DeJonge, Olive M. Draper, W. E. Edington, P. D. Edwards, S. H. Gould, H. E. H. Greenleaf, Ralph Hull, M. W. Keller, E. L. Klinger, R. E. Langer, Olive Lescow, Florence Long, Gladys B. McColgin, G. T. Miller, Vera T. Morris, Gloria Olive, P. W. Overman, T. P. Palmer, Philip Peak, J. C. Polley, D. H. Porter, Arthur Rosenthal, R. M. Ross, A. R. Schmidt, Sister Gertrude Marie, Aubrey Henderson Smith, C. P. Sousley, Anna K. Suter, R. O. Virts, and M. S. Webster.

The following officers were elected: Chairman, Professor C. P. Sousley, Rose Polytechnic Institute; Vice-Chairman, Professor H. W. Alexander, Earlham College; Secretary-Treasurer, Professor J. C. Polley, Wabash College.

The following papers were presented:

1. *The General Electric fellowship program for secondary school teachers of mathematics*, by Professor Ralph Hull, Purdue University.

The nature and purpose of the General Electric fellowship program, the selection of participants, and plans for its operation on the Purdue campus during the summer of 1953 were described.

2. *Plastic-strip models for non-euclidean geometry*, by Professor H. W. Alexander, Earlham College.

If a narrow, straight strip is cut from thin plastic and laid upon a curved surface in as close contact as possible, it will tend to lie upon a geodesic. If a suitable mesh of geodesics is chosen upon a curved surface, then an approximate model of the surface may be constructed by fastening narrow plastic strips together in a pattern isometric to that on the curved surface. This method is used to fabricate models for non-euclidean geometries of elliptic and hyperbolic type. We thus obtain flexible sections of the sphere and the pseudosphere.

3. *Is undergraduate mathematics part of general education?*, by Sister Gertrude Marie, Marian College.

Discrepancy between general education values of mathematics and the place accorded to mathematics in undergraduate curricula of representative colleges and universities is shown. Resources of mathematics capable of contributing significantly to realization of objectives of general education are balanced against the trend to relegate the subject to the status of "not required" or "alternative with science or philosophy." Recommendations include re-examination of the relationship of mathematics to other disciplines, revaluation of course materials on the basis of general importance, adoption of improved methods and newer instruction media, logical combination of branches of mathematics, and integration of subject matter with the student's total experience.

4. *The School and College Study of Admission with Advanced Standing*, by Professor J. C. Polley, Wabash College.

A brief description of a study, financed by grants from the Fund for the Advancement of Education, in which twelve colleges and twelve secondary schools are collaborating to examine the feasibility of, and set up standards for, granting college credit for courses taken in secondary school. Considered in particular are recommendations of the sub-committee on mathematics concerning a course sequence for the tenth, eleventh, and twelfth years, designed to replace present offerings and cover materials frequently included in the first year of college mathematics.

5. *Visualization in the integral calculus*, by Professor S. H. Gould, Purdue University.

On the principle that "ontogeny recapitulates phylogeny" the speaker discussed the advantage that can be gained in present day classrooms by visualizing the early attempts in the history of mathematics to find the volume of various solids.

6. *Sequential limit spaces*, by Professor J. L. Lawrence, Wabash College, introduced by Professor Polley.

Necessary and sufficient conditions on the collection of open sets are obtained in order that a subset having  $x$  as a limit point will contain a sequence of distinct points convergent to  $x$ . Such spaces are shown to be completely determined by a knowledge of the convergent sequences.

J. C. POLLEY, *Secretary*

#### THE MAY MEETING OF THE KENTUCKY SECTION

The annual meeting of the Kentucky Section of the Mathematical Association of America was held at the University of Louisville, Louisville, Kentucky, on May 9, 1953. Professor W. L. Moore, Chairman of the Section, presided at the morning and afternoon sessions.

Fifty-seven persons were present, including the following thirty-eight members of the Association:

H. H. Berry, J. M. Boswell, M. C. Brown, W. M. Bullitt, Esther A. Compton, J. B. Cornelison, H. H. Downing, R. I. Fields, Clarence Ford, A. W. Goodman, Reverend H. H. Gottbrath, Beulah Graham, Charles Hatfield, Aughtum S. Howard, G. B. Huff, Tadeusz Leser, A. G. McGlasson, D. G. Miller, W. L. Moore, R. S. Park, W. H. Pell, Sallie E. Pence, D. W. Pugsley, V. Elise Qualls, G. G. Roberts, W. J. Robinson, F. E. Ross, J. H. Simester, Sister M. Rosalin, Sister Mary Charlotte, R. H. Sprague, Guy Stevenson, R. P. Tapscott, J. T. Vallandingham, J. A. Ward, R. H. Wilson, T. M. Wright, W. M. Zaring.