6-10-64 To Annals MAA
c.c. to Chm. Robert V. Hogg

THE APRIL MEETING OF THE IOWA SECTION

The 51st regular meeting of the Iowa Section of the Mathematical Association of America was held at Luther College, Decorah, on April 17, 1964. Chairman Clarence H. Lindahl presided. Total attendance was 95, including 48 members of the Association. Routine business was considered during the afternoon meeting.

A report of the Iowa 1964 high school mathematics contest was given by T. A. Moilien of the Des Moines Actuaries Club, who sponsors it.

A treasurer's report was given and a balance of $251.92 was indicated.

The following officers were elected:

Chairman, Robert V. Hogg, State University of Iowa, Iowa City

Vice-Chairman, Donald E. Sanderson, Iowa State University, Ames

Secretary-Treasurer, Earle L. Canfield, Drake University, Des Moines

The following papers completed the program:

Friday morning, April 17, 1964, 9:45-10:45

Engel conditions on groups, by Professor Donald H. Pilgrim, Luther College, introduced by the Chairman.

Let g,c denote positive integers. A group is said to have type $(g \to c)$ if every subgroup which can be generated by g elements is nilpotent of class at most c. A result of R. H. Bruck shows that groups of type $(4 \to 5)$ without elements of order 2 are nilpotent of class at most 7. In the present paper the following result is reported: If G is a $(4 \to 5)$ group on 5 generators without elements of order 2, then G is nilpotent of class at most 6.

Relations between local and global properties, by Professor D. E. Sanderson, Iowa State University.

Two-neighborhood and one-neighborhood definitions of a local property and their relation to one another and to the corresponding global property are discussed. In particular, four definitions of locally compact are shown to be

equivalent for Hausdorff spaces but to be distinct in general. The problem of embedding a space having a given local property in one having this and the corresponding global property as in compactification presents interesting results and questions.

Epsilon-maps and chainable continua, by Joseph B. Fugate, State University of Iowa.

Theorem 1. If M is a compact metric continuum, then M is chainable iff for each $\varepsilon>0$ there exists an ε-map $f:M$ onto $[0,1]$.

Theorem 2. If M is a compact metric continuum such that for each $\varepsilon>0$ there exists an ε-map f from M onto the pseudo-arc, then M is homeomorphic to the pseudo-arc.

Quasi-homeomorphic snake-like continua, by Richard M. Schori, State University of Iowa, presented by the Chairman.

By snake-like we mean a compact metric chainable continuum. Two metric spaces X and Y are quasi-homeomorphic iff for each positive ε there exist ε-maps from X onto Y and from Y onto X. An arc and a pseudo-arc are snake-like and if X is quasi-homeomorphic to an arc (pseudo-arc), then X is homeomorphic to an arc (pseudo-arc). However, there exist quasi-homeomorphic snake-like continua that are not homeomorphic.

Undergraduate curriculum in revision, by Professor Lawrence A. Hart, Loras College.

Some of the problems involved in adjusting to recent recommendations locally were presented and a proposal was made that Iowa's graduate schools, colleges and junior colleges share their experiences of recent years. Of the eight points presented, the following were of most interest; first year placement, initiation of Departmental Honors Program, content of advanced calculus.

Homogeneity, by Professor R. H. Bing, University of Wisconsin. (By invitation.)

Friday afternoon 1:45 - 3:45

The work of the Committee on the Undergraduate Program in Mathematics, by Professor Robert H. McDowell, Washington University. (By invitation.)

Basic algebras of certain associative algebras, by Professor Drury W. Wall, State University of Iowa.

Let A be an associative, finite-dimensional, algebra with identity over a field F. Two idempotents e and f of A are isomorphic if and only if there exist a and b in A such that ab = e and ba = f. Let e be an idempotent of A which is the sum of mutually orthogonal primitive idempotents $e_1,\ldots,e_n$ which are chosen so that an idempotent of A is isomorphic to precisely one of the e_i . The subalgebra A* = eAe of A is called the basic algebra of A. Much information about A can be obtained by consideration of A*. In this paper specific algebras and their basic algebras will be constructed to illustrate differences between the properties of A and the properties of A*.

A remark concerning quasi-Frobenius rings, by Edgar A. Rutter, Jr., Iowa State University, presented by the Chairman.

Ikeda has shown that if A is an algebra of finite rank over a field K then A is a quasi-Frobenius ring if and only if

(a) every A-operator homomorphism between minimal left ideals of A is given by the right multiplication of an element of A. Dieudonne has proved that such algebras canbe characterized as quasi-Frobenius rings by the following condition:

(b) for every simple left A-module S, $S^* = \mathrm{Hom}_A(S,A)$ is either a simple right A-module or zero. The purpose of this paper is to show that conditions (a) and (b) are equivalent for arbitrary rings with identity.

Families of stable linear operators for the numerical solution of ordinary differential equations, by Professor Robert J. Lambert, Iowa State University.

This paper uses a well-known method of deriving difference equations of various orders for the numerical solution of differential equations. The difference equations are expressed in terms of arbitrary parameters which may be chosen appropriately to obtain higher order, stability, and explicit formula, or certain combinations of these properties. By proper choice of these parameters, predictor-corrector pairs can be constructed which are more efficient than other known pairs for solving ordinary differential equations.

Regions of stability of families of linear operators, by Jens A. Jensen, Iowa State University.

Consideration is given to some of the implications of the definitions of stability and order of a general linear k-step operator for the numerical solution of ordinary differential equations. The existence of various families of stable and unstable operators for a given k and a given order is discussed.

Some results using either stable or unstable linear operators, by Ronald Mehaffey, Iowa State University, presented by the Chairman.

The formulae presented show that an unstable explicit linear operator, used as a predictor for a stable implicit linear operator, may reduce the number of iterations necessary to converge to the solution of the difference equation, when the procedure is used in the numerical solution of ordinary differential equations. By examining the non-homogeneous difference equation satisfied by the error of the combined predictor-corrector method, an appropriate choice of the unstable explicit linear operator can be found. An example is provided to demonstrate this reduction of the number of iterations.