The April Meeting of the Iowa Section

The 45th meeting of the Iowa Section of the Mathematical Association of America was held at Drake University, Des Moines, Iowa, April 18, 1958. Professor A. H. Blue, Chairman of the Section, presided. Total attendance was 71, including 30 members of the Association. Routine business was considered during the afternoon meeting. As a result of the work by the Committee on Contests appointed a year ago, it was moved and seconded that the Committee be commended for their work and that the officers of the Section be empowered to go ahead with high school contests in mathematics on a limited basis. Motion carried.

It was agreed that the Iowa Section would meet jointly with the State University of Iowa's Annual Conference of Teachers of Mathematics in October, 1958.

The following officers were elected:

Chairman, Professor E. N. Oberg, State University of Iowa, Iowa City, Iowa

Vice Chairman, Professor R. S. Jacobsen, Luther College, Decorah, Iowa

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

The following papers completed the program:

Friday morning, April 18.

I. <u>Report of the committee on the problem of contests</u>

by

The Chairman, Professor Irvin H. Brune, Iowa State Teachers College

The following points were made in the report of the Committee on Contests:

1. Mixed reactions were noted by high school teachers, some in favor, some opposed to contests.
2. Many teachers reported contests were not permitted.
3. Members of the advisory board of the Iowa Association of Mathematics Teachers seemed not to be in favor of the contests.
4. A poll of teachers in convention at Des Moines resulted in 44 votes in favor and 13 votes against.
5. While the Committee itself saw merit in a talent search it doubted that a contest should in any way pit school against school or teacher against teacher. Rather the contest should be a search for talent, not a device for rating teacher efficiency.
6. The Committee recommended that the Iowa Section of Mathematical Association of America try the contest for one year, taking advantage of the offer of the National Committee to conduct the examination but that time remaining to prepare for a contest for 1958 is doubtful; consequently, 1959 would be a better beginning date.

II. Some Curious Results in Distance Geometry

by

(by invitation)

Professor Leonard M. Blumenthal, University of Missouri

The results discussed concern (1) non-congruent simplices with the same edges, (2) simplex-producing combinations of simplices, (3) a mapping of a bi-punctured n-sphere onto an (n-1) - sphere, (4) an uncountable class of non-rectifiable arcs of Hilbert space, and (5) metric continua without small acute triangles.

III. Grading Systems

by

Professor Fred Robertson, Iowa State College, Ames, Iowa

The author compared several grading or testing systems, in industry and schools, with the one commonly considered as the grading system.

IV. A Note on Defining an Extension of a Probability Measure on Subsets of Function Space By Applying One of J. L. Doob's Theorems

by

W. A. Small, Grinnell College, Grinnell, Iowa

Let W be the set of real-valued functions, w(t), of the real variable t. An extension (W,F_2,P_2) of a Fundamental Borel Probability Field (W,F_o,P_o) was defined by J. L. Doob and S. Kakutani. It may happen that an adjunction extension (W,F_o',P_o') of (W,F_o,P_o) exists through adjoining a subset W' of W to F_o. By applying one of Doob's theorems, the condition on the outer P_2 measure $P_2^*(W') = 1$ is seen to be necessary and sufficient for the existence of the corresponding adjunction extension (W,F_2',P_2') of (W,F_2,P_2). If (W,F_o',P_o') is measurable, then so is (W,F_2',P_2').

V. An Unusual Method of Teaching Logarithms

by

Professor Fred Robertson, Iowa State College

The author stressed the laws of operation needed for computation. The use of the tables is taught as an entirely different phase of the work. The tables of natural logarithms may be used first. Then a suggestion is made to change the tables of common logarithms. The terms characteristic and mantissa are not introduced.

VI. Uniform Convergence of the Second Differences

by

Uno R. Kodres, Iowa State College

A sequence of theorems, whose proofs were sketched, was used to characterize the class of functions whose second differences converge to zero uniformly.

VII. Exceptional Values of Metric Density

by

Professor N. F. G. Martin, Iowa State College

The usual definition of the metric density of a measurable set in E_1 at a point of E_1 is given. Then for a given real number λ, $0 < \lambda < 1$, a set is constructed whose density exists at 0 and has the value λ.

VIII. Note on the Classical Canonical Form of a Matrix

by

Professor J. C. Mathews, Iowa State College

A proof of the existence and uniqueness of the classical canomical form of a matrix is accomplished without the intervention of invariant factors, elementary divisors, or modules.

Using simple induction proofs a matrix A defined over an algebraically closed field is reduced to an intermediate canonical form B. At this point a final similarity transformation R is constructed such that $R^{-1}BR$ is classical. The proof of the uniquemess of the classical form of A is done by comparing ranks.

IX. Functions Whose Second Difference Goes to Zero

by

Professor Sidney D. Nolte, Iowa State College

If f(x) is defined on an open interval I, the second difference is defined to be $|f(x+h) - 2f(x) + f(x-h)|$. If a sequence $f_n(x)$, converges uniformly on I to f(x) and if $f_n(x)$ and if $f_n(x)$ is such that $\lim_{h \to 0} |f_n(x+h) - 2f_n(x) + f_n(x-h)| = 0$ for all h and all x in I, then f(x) also has this property.

Def: A function f(x) is said to satisfy a second difference Lipschitz condition of order α on I if there exists an M and a $\delta > 0$ such that $|f(x+h) - 2f(x) + f(x-h)| < M|h|^{\alpha}$ for all x in I and all $|h| < \delta$.

If f(x) in this definition is continuous at one point in I, and if $\alpha \geq 1$, then $f(x)$ is continuous at every point in I.

X. Maxima of Functions

by

John D. Miller, Iowa State College

By first defining what is meant by a real valued function of a real variable taking on a proper relative maximum or a non-proper relative maximum at a point, it is shown that a function can possess at most a denumerable number of proper relative maxima. Furthermore if a function takes on a relative maximum at every point of its domain of definition, then the range of the function is at most denumerable.