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November Meeting of the Indiana Section

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of (circa) 1700 B.C. concerning principles of Euclidean geometry formerly attributed solely to the Greeks of a later era. Two of the latest mathematical tablets unearthed contain unique and unusual solutions of triangle areas and their relationships.

9. *A variant of the two-dimensional Riemann integral*, by A. J. Goldman, National Bureau of Standards, Washington, D. C.

S. Marcus (this MONTHLY, 71 (1964) 544-545) proposed a variant of the two-dimensional Riemann integral and observed that $f(x, y) = x$ failed to be integrable. Here a necessary and sufficient condition is given for integrability, the gist of which is that the function must be very nearly constant. In particular, the constants are the only continuous integrable functions.

10. *Commutative semi-groups and pseudo-inverses*, by Kenneth D. Taylor, Army Map Service, Washington, D. C.

If c is such that $acb = ab$ for all a, b in the semi-group, then c is called a pseudo-inverse. The theorems and corollaries center about the principal theorem: If G is a semi-group with an element d in G such that for all a, b in G $adb = ba$, then the semi-group is commutative. The maximal sub-semi-group of G which is a group, is found. Finally, the question of whether an extension will produce a pseudo-inverse is discussed.

S. S. SASLAW, *Secretary*

MAY MEETING OF THE MARYLAND-DISTRICT OF COLUMBIA-VIRGINIA SECTION

The annual Spring meeting of the Maryland-District of Columbia-Virginia Section of the MAA was held at the University of Maryland, College Park, Maryland, on May 1, 1965. Dr. Daniel Shanks, Chairman of the section presided. There were 110 persons in attendance, including 96 members of the Association. Very lively discussions followed both the morning and afternoon sessions.

At the business meeting the following officers were elected:

Chairman, Professor Samuel S. Saslaw, United States Naval Academy, Annapolis, Maryland; Vice Chairmen, Professor Hyman Kamel, Howard University, Washington, D. C.; and Professor Thomas L. Reynolds, College of William and Mary, Williamsburg, Virginia; Secretary, Professor George N. Trytten, University of Maryland, College Park, Maryland; Treasurer, Professor Stanley B. Jackson, University of Maryland, College Park, Maryland.

The following program was presented:

1. *The aims and purposes of the Committee on the Undergraduate Program in Mathematics of the Mathematical Association of America*, by Samuel Eilenberg, Columbia University (invited address).

2. *Question and discussion period.*

3. *What Graduate Schools in the Area Expect of New Students*, Panel discussion. Participants: Gustav B. Hensel, Catholic University of America; John D. Miller, University of Virginia; Bruce Reinhart, University of Maryland.

4. *Question and Discussion period.*

S. S. SASLAW, *Secretary*

NOVEMBER MEETING OF THE INDIANA SECTION

The Indiana Section of the MAA met on Saturday, November 6, 1965, at Franklin College, Franklin. Approximately 100 persons attended, of whom 67 were members of the Association. Chairman George Springer of Indiana University presided. The morning was devoted to short papers and the afternoon to a business meeting and an invited hour address entitled "Categories" by Professor Samuel Eilenberg of Columbia University.

Papers presented at the morning session were:

1. *Fiducial theory and invariant estimation*, by R. B. Hora, Indianapolis Branch, Purdue University, and R. J. Buehler, University of Minnesota. (Report by R. B. Hora.)

Let P^ω be a family of distributions which satisfy assumptions that are essentially equivalent to those of Fraser (Biometrika, 48 (1962) 261) but are closer to those of Stone (Ann. Math. Stat., 36 (1965) 440). Let E_f denote fiducial expectation and E_R the conditional expectation given the ancillary. It is shown that for invariant functions $H(x, \omega)$, the identity $E_f H = E_R H$ holds. The identity has been applied to obtain best invariant estimators for "invariantly estimable functions." Finally, the relations between estimation of "invariantly estimable functions" and coset estimation and fiducial and confidence limits have been considered.

2. *Programmed instruction in college level mathematics*, by Thomas A. Davis, DePauw University.

This was a discussion of the use of programmed instruction in pre-calculus mathematics at DePauw University during 1964-65. The program included such topics as inequalities, absolute values, symmetry, asymptotes, and equations of straight lines. The performance of students who used the programmed material was slightly better than that of students who learned the same material by the traditional classroom lecture and discussion method. The time spent on the program was about one-half the time spent by the students who learned the material in the classroom.

3. *Binary relations as the basis for a fact retrieval system*, by Roger Elliott, Indiana State University.

A model for a computer fact retrieval system is developed. The model accepts facts and queries couched in a relational language, and it constructs data structures which are efficient for storing the input data and which permit efficient inference-making. Data are presented verifying an hypothesized independence of retrieval time of the size of the data base.

4. *Extremal properties of spline interpolants*, by Michael Golomb, Purdue University.

An extremal property possessed by interpolating spline functions was derived which includes all the minimizing properties of these approximants found previously (Schoenberg, Sard, Golomb-Weinberger, Holladay, et al.).

5. *On regular rings*, by Jiang Luh, Indiana State University. Following O. Steinfield, a subring Q of a ring A is said to be a quasi-ideal of A if $AQ \cap QA \subseteq Q$. In this paper characterizations for regular rings and for strongly regular rings are given in terms of quasi-ideals.

6. *Behavior of derivatives*, by A. Bruckner, University of California at Santa Barbara, visiting Professor at Purdue University.

The speaker gave an exposition of classical examples of functions possessing various properties with respect to differentiability.

7. *On the Hodgkin-Huxley partial differential equation*, by H. Melvin Lieberstein, Indiana University.

The equations for propagation of impulses on an unmyelinated squid axon are modified to include effects of core capacitance and inductance without introducing any new parameters. One equation is the one dimensional wave operator acting on a function whose values represent voltage across a surrounding membrane, set equal to a non-linear function of membrane voltage and its first time derivative. This is taken together with the first order differential equations for the Hodgkin-Huxley empirical parameters n , m and h . Voltage is specified as a $-15mv$ sawtooth or square impulse at a cut end and is required to be initially zero together with its first time derivative along the axon. This generates numerically a -100 or a $-103mv$ action potential. Initial waves of $-10mv$ die out. A wave which propagates with velocity and form constant to five digits develops as x and t increase; it satisfies a first order ordinary differential equation which replaces the former second order equation. Agreement with former calculations is excellent and the extreme sensitivity

to propagation rate is removed. The boundary value problem can be regarded as a model for transient development and propagation on a human muscle fiber. (The above work has been supported by NIH grant HE 10034).

Local arrangements for the meeting were in charge of Rodney Hood of Franklin College. President Wesley N. Haines of Franklin College welcomed participants on behalf of the college.

Six charter members of the Association now residing in Indiana were accorded special recognition at the meeting. These men are Will E. Edington, Gordon H. Graves, Paul R. Rider, Charles K. Robbins, Clarence P. Sousley and Harold E. Wolfe. Of these only Messrs. Graves and Rider were able to attend the meeting.

P. T. MIELKE, *Secretary*

NOVEMBER MEETING OF THE NEW JERSEY SECTION

The tenth annual meeting of the New Jersey Section of the MAA was held at Montclair State College, Upper Montclair, on November 6, 1965. Professor Max A. Sobel, Chairman of the Section, presided at the morning session. Professor Joshua Barlaz presided at the afternoon session. One hundred and forty-three persons attended the meeting, including one hundred and twelve members of the Association.

At the business meeting the following members were elected: Professor Joshua Barlaz of Rutgers University, Chairman of the Section (Nov. '66); Professor Bernard Greenspan of Drew University, Member-at-Large of the Executive Committee (Nov. '68); Professor Hale Trotter of Princeton University, Member-at-Large of the Executive Committee (Nov. '66); Professor John K. Reckzeh of Jersey City State College, Associate Secretary-Treasurer (Nov. '68); Professor Francis A. Varrichio of Saint Peter's College, Secretary-Treasurer. Reports were given by L. F. McAuley, Governor of the Section; J. Barlaz, Section Representative to the Summer meeting; W. A. Krzeminski, member of the High School Contest Committee; F. A. Varrichio, Secretary-Treasurer.

At the morning session the following papers were presented:

1. *Logic: Fad or Tool?* by Prof. Hassler Whitney, Institute of Advanced Study, Princeton, N. J. (By invitation.)

Many texts in general mathematics contain a chapter on logic; it commonly seems unconnected with actual mathematics, and is likely not to be made use of later. Yet all mathematics uses logical reasoning throughout. What is really needed is to understand the elementary principles used in actually carrying on mathematics. This involves not only propositions and quantifiers, but also an understanding of the use of symbols, the meaning of statements relative to the underlying hypotheses, etc. Various simple examples are given to illustrate these ideas.

2. *Countable Topological Spaces*, by Albert Wilansky of Lehigh University, Bethlehem, Pa. (By invitation.)

Let X be a countable T_1 space. If regular, it is normal, zero-dimensional, totally disconnected. If regular and first countable or locally compact, it is metrizable, indeed a subset of the rationals. Let $\beta = N \cup \{t\}$, $t \in \beta N/N$. Then β is normal, not first countable, pseudofinite, hemicompact. Any hemicompact first countable space is locally compact. Let $X = \{t\} \cup N$ with N discrete, $t \in \bar{N}$; deleted neighborhoods of 0 being $\{S: \lim_{A \times X}(S) = 1\}$, A a fixed positive regular matrix. A. K. Snyder has associated topological properties of X with summability properties of A .

The afternoon session consisted of a panel discussion of *The Twelfth Year Program in High School Mathematics*. The panelists were: Mr. Martin Moskowitz of Vailsburg High School, Newark, N. J., Mr. Henry Peterson, Wayne Senior High School, Wayne, N. J., and Dr. Anthony Pettofrezzo, Montclair State College.

F. A. VARRICHIO, *Secretary*