NEWS ITEM

The Stanford Competitive Examination in Mathematics is being discontinued as of the spring of 1965. Over the past twenty-one years students in most of the high schools in the far Western states participated in this annual competition.

This competitive examination, which was initiated and organized by Professors G. Polya and G. Szego, was one of the pioneering efforts to use such competition in high schools as a means of stimulating interest in mathematics and in problem-solving in particular, and to discover and encourage students of unusual ability.

The competition was administered by the Department of Mathematics of Stanford University which records its appreciation of the generous cooperation of the many high school teachers and administrators who gave freely of their time to conduct examination sessions.

THE AFRICAN-AMERICAN INSTITUTE

The African-American Institute, 345 East 46th Street, New York, N. Y. 10017, has immediate openings for high school teachers of mathematics, with preference for those able to teach at least one science as well. Teachers will fill two-year AAI contracts either in Nkumbi International College, north central Zambia, or Kurasini International Education Center, Dar es Salaam, Tanzania. Maintained by AAI, both schools are primarily for refugee students from southern Africa. Certification and at least three years' teaching experience required. Master's degree preferred. Appointees receive round-trip transportation for themselves and dependents, overseas allowances, free housing, various fringe benefits in addition to salary, which ranges from $6,500 to $9,400, depending upon candidates' qualifications and prior earnings. Application forms should be requested from AAI Personnel Assistant at the address above.

CORNELL UNIVERSITY

On July 1, 1965, Cornell University established an intercollege Department of Computer Science in the Colleges of Engineering and Arts and Sciences. To aid the creation of this department and further its growth, the Alfred P. Sloan Foundation has awarded Cornell University a grant of one million dollars. The fields of study and research now represented include programming languages and systems, numerical analysis, data processing and information retrieval, and automata theory and theory of computation. The Department of Computer Science is authorized to grant the Ph.D. and M.S. degrees in Computer Science.

Further information can be obtained by writing to Professor J. Hartmanis, Department of Computer Science, Upson Hall, Cornell University, Ithaca, New York.

MATHEMATICAL ASSOCIATION OF AMERICA

Official Reports and Communications

MAY MEETING OF THE ROCKY MOUNTAIN SECTION

The forty-eighth annual meeting of the Rocky Mountain Section of the Mathematical Association of America was held at Colorado School of Mines, Golden, Colorado, on Friday and Saturday, May 7 and 8, 1965. The Rocky Mountain Section of SIAM participated.

There were 122 people registered for the meeting including Dean William E. Briggs, Sectional Governor, and Professor Fred M. Carpenter, Section Chairman.

An invited address was given on Friday afternoon by Professor Marvin Marcus of the University of California, Santa Barbara. Professor Marcus spoke on "Some Techniques for Proving Inequalities." On Saturday morning Dr. George W. Morgenthaler, Visiting Professor, University of Colorado and Department Manager, Martin Marietta Corporation, delivered an invited address on "Some Problems in Non-Linear Vibrations in N-degrees of Freedom Systems."

At the banquet Friday night Professor J. R. Lee of Colorado School of Mines presided. The Section was welcomed by Dr. Anton G. Pegis, Assistant to the President, Colorado School of Mines, and Sectional Governor W. E. Briggs gave a brief talk. Following the banquet the Section was entertained by the Adolph Coors Company.

The business meeting was held on Saturday morning, May 8, 1965, with Professor Carpenter presiding.

The secretary distributed copies of the By-Laws adopted May 2, 1964, revised to conform to the suggestions made by Dr. Paul Johnson (UCLA) ex-Chairman of the Committee on Sections. The motion was made, seconded and carried that the By-Laws be adopted as revised.

The chairman appointed Professor Robert W. Ellingwood, Colorado University, to a three year term on the Meeting Committee and Professor William Dorgan, Western State College, to a three-year term on the Nominating Committee. Those standing committees are now:

Meeting Committee: Donald Robinson, Brigham Young University; R. E. Doutt, South Dakota School of Mines; Robert W. Ellingwood, Colorado University.

Nominating Committee: Kenneth Noble, Denver University; Chairman: F. N. Fisch, Colorado State College; William Dorgan, Western State College.

The following officers were elected for 1965–66: Chairman, F. Max Stein, Colorado State University; Vice-Chairman, W. E. Dorgan, Western State College; Secretary-Treasurer, W. Norman Smith, University of Wyoming.

Professor E. R. Deal, Contest Chairman of the Annual High School Mathematics Contest, reported that 143 schools had requested 7618 tests; 135 schools returned results —15 from Wyoming, 30 from Utah and 90 from Colorado.

The following papers were presented at the meetings:

1. *Separation and interlacing theorems*, by L. C. Barrett, South Dakota School of Mines and Technology.

In this paper, separation and interlacing theorems pertaining to zeros of the functions $f_i(\lambda)$ and $F(\lambda)$, which may occur in a quite general equation of the type $F(\lambda)\equiv f_1(\lambda)f_4(\lambda)-f_2(\lambda)f_3(\lambda)=0$ are given. It is pointed out how these theorems may be utilized to isolate the characteristic numbers of a general Sturm-Liouville system involving a single pair of interface boundary conditons.

2. *Descending chain condition rings with cyclic quasi-regular group*, by K. E. Eldridge, University of Colorado.

It is known for associative rings that the set of all quasi-regular elements forms a group with respect to the circle operation. This group is called the quasi-regular group of the ring. Using the fact that the Jacobson radical is a subgroup of the quasi-regular group and the well-known Wedderburn-Artin structure theorem, it is shown that all descending chain condition rings with a cyclic quasi-regular group are finite.

3. *The characteristic functional of a nonhomogeneous Poisson process*, by Meckinley Scott, Colorado School of Mines.

The process considered is a birth process where the probability of a birth in $(t,\ t+\delta t)$ is

$\lambda_n\delta t+o(\delta t)$, when n is the number of individuals existing in the system at time t. The characteristic functional for this process is obtained and the result given in the form of a sum of n-fold integrals. The integrals can easily be evaluated for the special cases where (i) $\lambda_0=\lambda_1=\cdots=a$ (constant) and (ii) $\lambda_n=a+nb$, $b\neq 0$.

4. *An exact perimeter inequality for the pedal triangle*, by A. Zirakzadeh, University of Colorado.

5. *A note on the trigonometric, quasi-trigonometric, Jacobian elliptic, and hyperbolic functions*, by F. M. Stein, Colorado State University.

The Jacobian elliptic functions arise as solutions of certain nonlinear differential equations. It is shown that the trigonometric and hyperbolic functions can be obtained from these differential equations by a proper choice of the parameter involved. New functions are then defined by allowing the parameter to become imaginary.

In a similar manner it is shown that the quasi-trigonometric functions defined in the paper, *Quasi-Trigonometry*, by Strand and Stein, this MONTHLY, 69 (1962) 143–147, also satisfy certain nonlinear differential equations and reduce to known functions for proper choices of the parameter.

6. *Class of solvable sum equations*, by S. W. Reyner and L. C. Barrett, South Dakota School of Mines and Technology.

Given functions $f(z, n)$ and $K(n, k)$ determine $g(z, n)$ so that (1) $f(z, n)=\sum_{k=0}^{n}K(n, k)g(z, k)$. For what $K(n, k)$ can (1) be solved for g by interchanging g and f? Given $\{b_m\}$, define $a_{n,k}=\prod_{m=k+1}^{n}b_m (k<n)$, $a_{n,n}=1$. If $K(n, k)$ is such that (1) is solved for $g(z, n)$ by interchanging f and g, then $K^*(n, k)=a_{n,k}K(n, k)$ also has this property.

7. *Generalized orthogonality and null series*, by Richard Nau and L. C. Barrett, South Dakota School of Mines and Technology.

This paper is primarily concerned with two related problems, namely: (1) that of deriving generalized orthogonality conditions for the characteristic functions of physical systems involving lumped parameters, and (2) an investigation of the behavior of a particular null series within and outside the fundamental interval of convergence. In deriving generalized orthogonality conditions direct use is made of the definition of Stieltjes integral as the limit of a sum.

8. *Pairs of bilinear and quadratic equations in a finite field*, by A. D. Porter, University of Wyoming.

Let $F=GF(q)$ be the finite field of $q=p^r$ elements, p odd, and consider the pair of equations $a_1x_1^2+\cdots+a_nx_n^2=a$; $b_1x_1y_1+\cdots+b_nx_ny_n=b$ with all coefficients from F. Explicit formulas are obtained for the number of simultaneous solutions, $x_1, y_1, \cdots, x_n, y_n$, in F of this system. It is then noted that solutions to the system always exist for $n\geqq 3$.

9. *Geometrical line-fitting*, by B. L. Foster, Denver Research Center-Marathon Oil Company.

For the over-under-over theorem discussed by Scheid (this MONTHLY, 68 (1961) 864), the order of deviations is important, as pointed out by Biesterfeldt. Thus Foster's result (this MONTHLY, 71 (1964) 960) is wrong. A correct version reads: The y-Chebyshev line equals the x-Chebyshev line, for a monotone set of data points. The over-under-over theorem also implies that the Chebyshev line for a data triangle is a midpoint line and that each midpoint line is the Chebyshev line for all directions it subtends (proved by Deal). The exceptional case of a direction parallel to a triangle edge explains the apparent discontinuity in passing from one midpoint line to another.

10. *Early mathematicians' works in meteorology—theories on thunder and lightning*, by H. H. Frisinger, Colorado State University.

A presentation of early theories on thunder and lightning by mathematicians from the ancient Greek period up to the end of the seventeenth century.

11. *There are no generalized functions*, by Greg Canavan, U. S. Air Force Academy.

Laurent Schwartz' approach to generalized functions through functionals defined on a space of test functions gives a rigorous basis for their use. Using the test space $\{e^{-st}; t \geqq 0\}$, the functionals of Schwartz' definition are reduced to the familiar Laplace transform. Generalized functions are taken to be all functions of s which are not the Laplace transforms of ordinary functions. Hence, generalized functions are simply ordinary functions of the complex variable s. An isomorphism exists between the rational functions of s arising in this manner and the rational functions of s (the differential operator) which are the generalized functions in Mikusinski's Operational Calculus.

12. *Impossibilities of a generalized interpolation by transcendental analytic functions and polynomials*, by Daihachiro Sato, University of Saskatchewan.

Since an analytic function is determined by its Taylor series at any point, it is not possible to prescribe arbitrarily all derivatives of an analytic function even at one point. If, instead of determining the values, we merely restrict them to a certain set, it may (or may not) become possible to prescribe all derivatives to be in the set. Attention is given to the cases at which this type of generalized interpolation is not possible. The following elementary examples, among others, which are special cases of more general ones to be given are typical for the impossibilities of this type of generalized interpolations. 1. There is no nonconstant polynomial all of whose higher derivatives assume real values at 1 and i. 2. There is no entire function all of whose higher derivatives assume real values at 1, i and $w=(-1+3i)/2$. 3. Let S be the set of the first k positive integers, i.e., $S=\{1, 2, 3, \cdots, k\}$. If $k>1$, then there is no analytic function all of whose higher derivatives map S into itself.

W. N. SMITH, *Secretary-Treasurer*.

THIRD COOPERATIVE SUMMER SEMINAR

The Mathematical Association of America will sponsor a third Cooperative Summer Seminar for college teachers of mathematics during the period of June 20- August 12, 1966 at Bowdoin College in Brunswick, Maine. Grants from the Alfred P. Sloan Foundation and from the National Science Foundation are furnishing financial support for the Seminar.

Activities will include daily lectures on topics in applied mathematics by Professor G. F. Carrier of Harvard University and on topics in analysis by Professor E. J. McShane of the University of Virginia.

Participants will be selected from applicants who teach in colleges or universities which offer an undergraduate major in mathematics but which do not offer a Ph.D. degree in mathematics.

Brochures describing the Seminar have been sent to all MAA members as well as to department chairmen in all colleges and universities. Additional copies and application forms may be obtained from V. O. McBrien, Director, MAA Cooperative Summer Seminar, Department of Mathematics, College of the Holy Cross, Worcester, Mass. 01610.

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