IOWA SECTION MAA NEWSLETTER

Vol. II No. 2 Edited by Donald V. Meyer March 1986

JOINT MEETINGS OF THE IOWA SECTIONS OF MAA, SIAM, ASA

University of Iowa, Iowa City
April 11-12, 1986

Friday sessions in Van Allen Hall
Saturday sessions in Chemistry-Botany Bldg

FRIDAY, APRIL 11 301 Van Allen

12:30 Registration

1:15 Eugene Herman, Grinnell University: "The Math Student's Computer Toolkit in the 1990's"

STUDENT PAPERS (20 minutes, unless stated otherwise)

2:20 Dafna Yardeni, Maharishi International: "Parallels Between Maharishi's Vedic Science and Set Theory"

2:45 Brenda Sacry/Susan Wright, Graceland: "Pursuit of the Vanishing Valedictorian"

3:10 Scott Rothfus, Drake: "On the Characteristic Polynomial of Some Large Graphs"

3:35 Ruth Gornet, Drake: "On Unusual Vertices in Small Graphs"

4:00 Anne Koopman, Loras: "And Model Theory Presents..." (40 min.)

4:45 Tracy Parks, Drake: "On the Similarity of Trees"

5:10 Albert Goodman/Kevin Maubeck/Byron Ricks, Grinnell: (winning paper in the Mathematical Competition in Modeling. 40 min)

6:00 Dinner, on your own

8:00 - Party, hosted by the Department of Statistics and Actuarial Science, University of Iowa, Triangle Club Lounge, Student Union

SATURDAY, APRIL 12, 225 Chem-Botany

8:00 Registration, Coffee and Rolls

8:30 Graeme Fairweather, University of Kentucky: "On Solving Certain Almost Block Diagonal Linear Systems"

9:45 Lynn Steen, St. Olaf College: "Mimicry, Magic or Mathematics: Which shall it be?"

11:00 Student Awards

11:10 Business Meetings

11:40 Lunch, on your own

CONCURRENT SESSIONS, Contributed Papers

SESSION A, 65 Chem-Botany

1:00 Irvin & Robert Hentzel, ISU: "Triangular Puzzle Peg"
1:25 Noel Cressie, ISU: "Spatial Prediction of Acid Rain Using Kriging"
2:00 Robert Hogg, Iowa: "All Observations Are Not Created Equal"
2:35 Stuart Kleigman, Iowa: "Shrinkage Estimation With Actuarial Applications"
3:10 W. Robert Stephenson, ISU: "Quality Control: Helping Industry in Iowa"
3:45 Joseph Sedransk, Iowa: "Assessing Patterns of Care in Radiation Therapy: Sample Design Analysis"

SESSION B, 206 Chem-Botany

1:00 Catherine Gorini, Maharishi International: "Topology and Topos Theory"
1:25 Robin Ticciati, Maharishi International: "Geometry in Unified Field Theories of Physics"
1:50 Patsy Milton, Drake: "A Markov Chain Model in the Study of Student Performance"
2:15 Friedmar Schulz, Iowa: "Bernstein's Theorem for Minimal Surfaces"
2:50 Gary Lieberman, ISU: to be announced
3:25 Rajbir Dahiya, ISU: "Computation of Multi-dimensional Laplace Transforms"
4:00 Ezio Venturino, Iowa: "The Steady State Temperature Distribution in an Infinite Room with a Window"

SESSION C, 233 Chem-Botany

1:00 Robin Harte, Iowa: "Posiive Elements and the B^* Condition"
1:25 A.M. Fink, ISU: "How to Polish Off Median Polish"
1:50 A.F. Kleiner, Drake: "A Curious Approach to Higher Derivatives"
2:15 Milan Randić, Drake: "On Graph Theoretical Polynomials"
2:40 Michael Millar, UNI: "Geometric Transformations: Some General Applications"
3:05 Bernadette Baker, Drake: "Isospectral Multigraphs"
3:30 Charles Jepsen, Grinnell: "On Colorings of Finite Projective Planes"
3:55 Kent Fuller, Iowa: "The Cartan Determinant Problem"

ON SOLVING CERTAIN ALMOST BLOCK DIAGONAL LINEAR SYSTEMS

Graeme Fairweather
University of Kentucky

ABSTRACT: In various methods for the numerical solution of two-point boundary value problems with separated boundary conditions (TPBVPs), linear algebraic systems with a particular structure, called almost block diagonal, are encountered. In this talk, we provide an overview of the trapezoidal rule, the method of spline collocation at Gaussian points, and multiple shooting, and discuss algorithms for the solution of the almost block diagonal systems arising in these methods. All three methods are of particular interest since they are implemented in general-purpose software packages for solving TPBVPs. We describe pivotal and elimination strategies which, in contrast to ordinary Gaussian elimination with partial pivoting, introduce no fill-in, and lead to the development of more efficient algorithms. To demonstrate the efficacy of these algorithms, we present the results of numerical experiments conducted on a scalar machine and a vector pipeline machine.

BERNSTEIN'S THEOREM FOR MINIMAL SURFACES

Friedmar Schulz
University of Iowa

ABSTRACT: A modern proof of one of the best known theorems in analysis will be presented: A graph of zero mean curvature over the entire xy-plane is necessarily a plane.

THE STEADY STATE TEMPERATURE DISTRIBUTION IN AN INFINITE ROOM WITH A WINDOW.

Ezio Venturino
University of Iowa

ABSTRACT: In this talk the steady state temperature distribution problem for an infinite room (i.e. a quarter plane) is formulated. It is assumed that the room is insulated everywhere except for a window, along one of the axes, on which the temperature distribution is known. We show why the usual Fourier method "fails". However, it is possible to introduce a new unknown function and an integral equation containing a singular integral. Such a term is interpreted in the usual Cauchy principal value sense. A method for the solution of such equation is provided. In turn this yields the sought steady problem. Comparison with the finite difference solution scheme is discussed.

THE CARTAN DETERMINANT PROBLEM

Kent Fuller
University of Iowa

ABSTRACT: Associated with each Artinian ring R is the Cartan matrix C=C(R), a square integral matrix whose entries are determined by the composition series of the indecomposable projective R-modules. In 1954, S. Eilenberg observed that if R has finite global dimension, then det(C)=+1 or -1. There are no known examples in which -1 is attained. Background for and recent progress on the question that naturally arises will be discussed.

GEOMETRIC TRANSFORMATIONS: SOME GENERAL APPLICATIONS

Michael H. Millar
University of Northern Iowa

ABSTRACT: Applications of arbitrary isometries and similarity transformations of the Euclidean plane illustrating some remarkable and little known properties pertaining to the congruence and similarity of Euclidean convex polygons.

A MARKOV CHAIN MODEL IN THE STUDY OF STUDENT PERFORMANCE

Patsy Milton and Luz M. DeAlba
Drake University

ABSTRACT: A Markov chain model is suggested for studying student performance. Tests of hypothesis are performed on data otained from elementary mathematics courses at Drake University.

PURSUIT OF THE VANISHING VALEDICTORIAN

Brenda Sacry and Susan Wright
Graceland College
Lamoni, IA 50140

ABSTRACT: A student's ranking within a class depends on the grade point system used rather than on the student's grades. An example of three students with identical classes demonstrates that each of the students could be ranked highest by using three common grade point systems. A study of actual grades shows the effect of using different grade point systems to determine class rankings.

1986 MATHEMATICAL COMPETITION IN MODELING

Albert Goodman, Kevin Manbeck, Byron Ricks
Grinnell College

ABSTRACT: This paper considers the problem of locating two emergency stations in a small township so as to minimize the total response time to all emergencies. This problem was solved by a computer program which determines the response time for all possible solutions and finds the optimal one. The problem was first approached by assuming that emergencies occur only at the center of blocks and that stations are located only on street corners. The problem was then generalized to allow the emergencies and stations to be located anywhere along the streets. The paper concludes that the optimal solution for the general case is the same as that for the simpler case.

HOW TO POLISH OF MEDIAN POLISH

A. M. Fink
Iowa State University

ABSTRACT: For commensurable data, median polish of a two way table converges to a fixed point of the median polish operator. The median polish operator decreases the ℓ_1 norm, however fixed points of the median polish operator may not be minimum ℓ_1 solutions. We construct an algorithm to solve the minimum ℓ_1 solution.

COMPUTATION OF MULTI-DIMENSIONAL LAPLACE TRANSFORMS

R. S. Dahiya
Iowa State University

ABSTRACT: The object of this paper is to establish several new formulae for calculating multi-dimensional Laplace transforms from known one-dimensional Laplace transforms. The formulae are applied to the most commonly used transcendental functions. These transform pairs are then used in solving boundary value problems.

AND MODEL THEORY PRESENTS...

Anne Koopman
Loras College
Dubuque, Iowa

ABSTRACT: Model Theory is the branch of mathematical logic which deals with the relation between a formal language and its interpretations, or models. Topics of interest are the cardinality of a language, consistent theories, closed theories, isomorphic models, elementarily equivalent models, ways to construct models.

An important result is that a set of sentences has a model if and only if every finite subset has a model. (Godel's Compactness Theorem). Another simply-stated theorem with far-reaching consequences is the Lowenheim-Skolem-Tarski Theorem: If a theory in a first-order language L has infinite models, then it has infinite models of any given power $\mu \geq |L|$. From these results it follows that there exist nonstandard models of complete number theory and also exotic non-Archimedean ordered fields elementarily equivalent to the ordered field of real numbers that we know and love.

POSITIVE ELEMENTS AND THE B^* CONDITION

Robin Harte and Michael O'Searcoid
University College
Cork, Ireland

ABSTRACT: Topological norm additivity for positive elements of a B^*-algebra is derived, and applied to give joint spectral permanence.

SUMMARY: The basic theory of the "positive elements" of a B^*-algebra is derived from the B^*-condition $\|a\|^2 \leq \|a^*a\|$ by a combination of elementary argument, the spectral radius formula and the square root lemma. In the process a sort of "topological norm additivity" $\|a\|^2 \leq \|a^*a + b^*b\|$ emerges. In this note we locate the additivity condition in the development of the theory of positive elements, and use it to extend "spectral permanence" from single elements to more general systems.

TOPOLOGY AND TOPOS THEORY

Catherine Gorini
Maharishi International University
Fairfield, Iowa

ABSTRACT: Topos theory is a foundational theory of mathematics which synthesizes the viewpoints of category theory and set theory. In this paper, relationships between topos theory and topology will be discussed.

PARALLELS BETWEEN MAHARISHI'S VEDIC SCIENCE AND SET THEORY

Dafna Yardeni
Maharishi International University

ABSTRACT: The empty set represents the three-in-one structure of pure intelligence described by Maharishi Mahesh Yogi. The process of manifestation from this unified structure of pure intelligence, carried out by menas of the eight prakritis, is reflected in the axioms of set theory.

GEOMETRY IN UNIFIED FIELD THEORIES OF PHYSICS

Robin Ticciati
Maharishi International University

THE MATH STUDENT'S COMPUTER TOOLKIT IN THE 1990s

Eugene A. Herman
Grinnell College

ABSTRACT: What computing power are students likely to have at hand in the 1990s? What software might this include that could be used in mathematics courses? How might mathematics instructors capitalize on the availability of this computing power? In this lecture, I will speculate on all three questions, but especially the last two. The speculations will be extrapolations based on current hardware and software trends and on classroom experiments currently taking place at various institutions.

ON GRAPH THEORETICAL POLYNOMIALS

Milan Randić
Drake University

ABSTRACT: Briefly we will review a half a dozen graph theoretical polynomials: the Characteristic polynomial, the Matching polynomial, the Distance polynomial, the Generalized Wheland polynomial, the Terminal polynomial and others. The last two polynomials have only recently been introduced by this author and collaborators. Among the properties discussed will be factoring of the characteristic and matching polynomials, recursive relations and spectral and nodal properties, in particular of the characteristic polynomials.

ISOSPECTRAL MULTIPGRAPHS

Bernadette Baker and Milan Randit
Drake University

ABSTRACT: Browsing the literature on isospectral graphs one cannot escape noticing a lack of results on isospectral multigraphs (i.e., graphs having multiple connections). Using "ultimate pruning" technique (developed for factoring of the characteristic polynomials of trees) we examined all trees having n=1- and less vertices for the conditions that lead to occurence of isospectral multigraphs. The smallest pair of isospectral trees having a single multiple edge has only six vertices. The isospectrality is independent of the multiplicity (weight) of a multibond. Hence when the weight is formally assumed to be zero, an isospectral forest is obtained.

ON THE SIMILARITY OF TREES

Tracy Parks
Drake University

ABSTRACT: Similarity among graphs and trees in particular is of interest in various sciences, including such apparently diverse uses as illustration of phylogenetic relationships for biological species or points to common features in diverse drugs with a same therepeutic use. We will review alternative characterizations of trees, alternative codes, alternative metrics, and alternative clustering. In particular we will consider the problem of local similarity.

TRIANGULAR PUZZLE PEG

Irvin Roy Hentzel
Iowa State University

Robert Roy Hentzel
Ames, Iowa

ABSTRACT: The participant is given an array of fifteen pegs arranged in a triangular pattern. He is instructed to remove one peg and then by a sequence of jumps, reduce the array to a single peg. The jumps are performed as in Chinese checkers, except that the intermediate peg is removed.

We solved this puzzle on an Apple IIe computer. Using this program to recognize solvable board situations, we developed a simple formula which assigns a value to the board position. If this value is greater than one, the board position is not solvable. This formula can be used as an oracle when choosing a move. (Never make a move which raises the parity to a number greater than one.) This formula is also used to analyze the versions of the game where the position of the first peg removed and the position of the last peg are specified.

Our formula is heavily dependent on the particular shape of the board. If jumping outside the original triangle is allowed, the results of the formula are no longer valid.

ON THE CHARACTERISTIC POLYNOMIAL OF SOME LARGE GRAPHS

Scott Rothfus
Drake University

ABSTRACT: We will consider a class of trees of considerable size (typically having hundred and more vertices) and the problem of construction and factoring of their characteristic polynomial. The graph derived represents so called path graphs, i.e., they depict paths in cyclic graphs. An important theorem of Godsil indicates that one of the factors of the characteristic polynomial of path graphs is the matching polynomial for cyclic graphs used for the construction. We will show that the approach is a practical scheme for obtaining the matching polynomial.

ON UNUSUAL VERTICES IN SMALL GRAPHS

Ruth Gornet
Drake University

ABSTRACT: Occasionally one finds in relatively small graphs (i.e., graphs having half a dozen to dozen vertices) that symmetry nonequivalent vertices have a same amplitude (i.e., the coefficient in the first eigenvector). It is of interest to investigate what structural (connectivity) conditions contribute to this. We have examined a number of smaller graphs and detected unusual vertices in several instances. The vertices appear as equivalent and allow some manipulations with the graphs that do not alter their unusual characteristics. We will give few illustrations and will point to some regularities which allow one to predict occurence of unusual points in larger graphs.

A CURIOUS APPROACH TO HIGHER DERIVATIVES

A. F. Kleiner and M. Randić
Drake University

ABSTRACT: We start with a freshman level error in defining the idea of second derivative and develop a formula for computing the second derivative of a function f from f itself. This formula is then extended to a class of formulae each of which can be used to compute $f''(a)$ when it exists. It is further shown that each formula works on functions which do not have second derivatives. In fact such formulae can apply to functions which are extremely bad. Extensions to higher derivatives are also given.

ON COLORINGS OF FINITE PROJECTIVE PLANES

Charles H. Jepsen
Grinnell College

ABSTRACT: Suppose the points of the finite projective plane of order n are colored with n colors. J. Kabell showed that at least one line must contain points of at most $n-1$ colors. J. Csima strengthened this for planes of odd order by showing that at least one line must have three points of the same color.

In this paper, we improve Kabell's result by proving that for $n \geq 3$, any n-coloring of $PG(2,n)$ must produce at least n lines containing points of at most $n-1$ colors. In addition, we exhibit a coloring where the lower bound n is attained.

Treasurer's Report

Balance December 31,1984			$763.00
Income			
National Allotment	$140.00		
Interest on Bank Acct.	43.20		
Meeting Fees	144.00		
Party Fees	60.00		
MAA Book Sale	33.60		
		$420.80	
Expenses			
Printing	111.51		
Refreshments	53.86		
Speaker Expenses	100.00		
MAA Book Sale	33.60		
		$298.97	
Balance December 31, 1984			$884.83

Alan J. Heckenbach
Secretary/Treasurer

DIRECTIONS

ENTER IOWA CITY FROM I-80 BY EXITING AT THE DUBUQUE STREET EXIT AND PROCEED SOUTH.

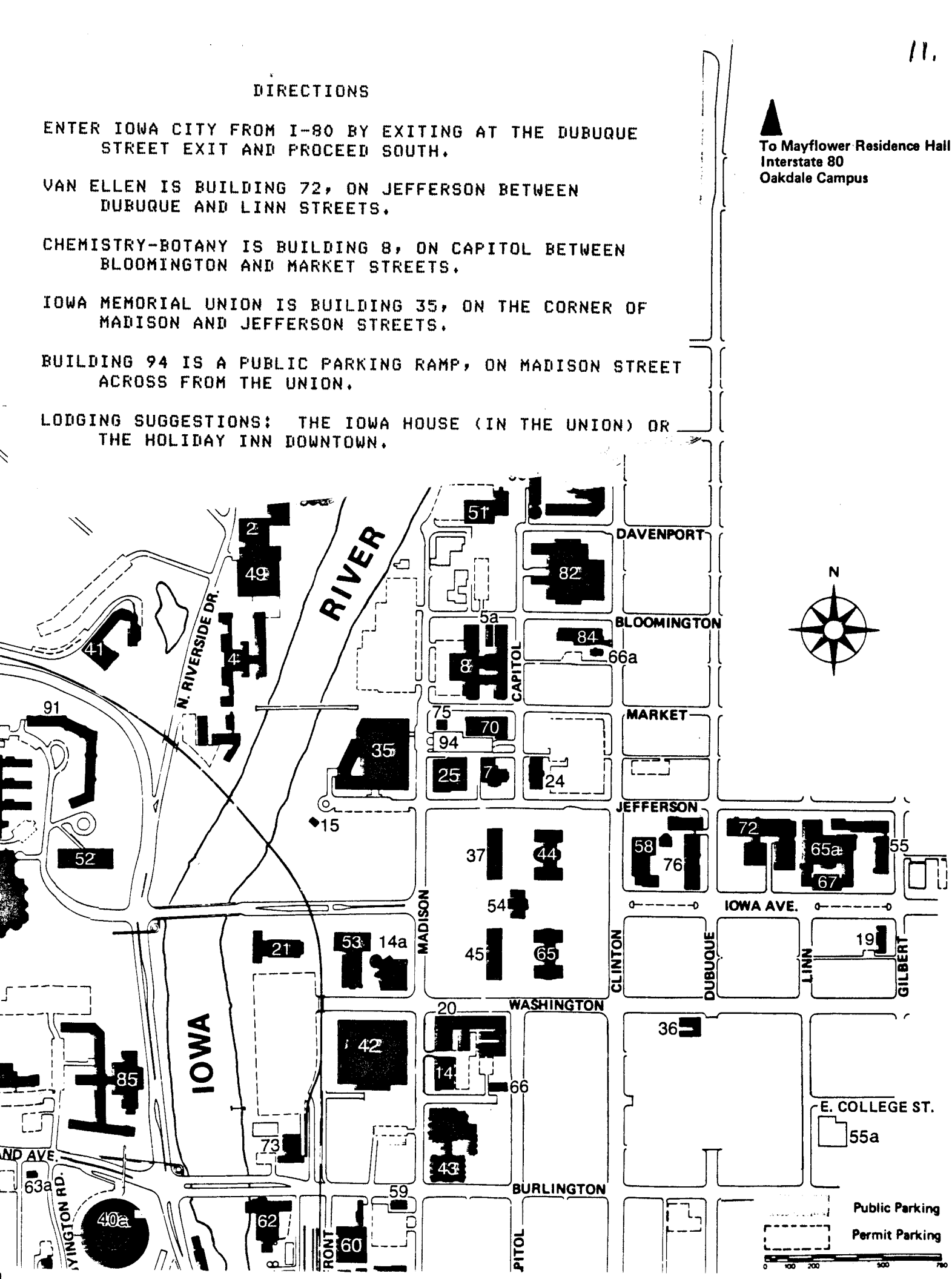
VAN ELLEN IS BUILDING 72, ON JEFFERSON BETWEEN DUBUQUE AND LINN STREETS.

CHEMISTRY-BOTANY IS BUILDING 8, ON CAPITOL BETWEEN BLOOMINGTON AND MARKET STREETS.

IOWA MEMORIAL UNION IS BUILDING 35, ON THE CORNER OF MADISON AND JEFFERSON STREETS.

BUILDING 94 IS A PUBLIC PARKING RAMP, ON MADISON STREET ACROSS FROM THE UNION.

LODGING SUGGESTIONS: THE IOWA HOUSE (IN THE UNION) OR THE HOLIDAY INN DOWNTOWN.



FUTURE MEETING SCHEDULE

April 11,12,1986	Iowa Section MAA Spring Meeting University of Iowa Iowa City, Iowa
August 3-11, 1986	International Congress of Mathematics University of California Berkely, Calif.
January 22-25, 1987	MAA Annual Meeting San Antonio, Texas
January 7-10, 1988	MAA Annual Meeting Atlanta, Georgia

IN MEMORY

Clair Maple, Director of the ISU Computation Center since 1962 and a nationally known expert in the use of computers in teaching and research, died August 14, 1985, while attending a national seminar on academic computing in Snowmass, Colorado.

Clair George Maple was born March 17, 1916 in Glenwood, Indiana. He received the A.B. degree in 1939 from Earlham College, the M.S. degree in 1940 from the University of Cincinnati and the D.Sc. in 1948 from the Carnegie Institute of Technology.

He was on the faculties of West Virginia Tech, Ohio State University, Carnegie Tech and North Texas State University prior to joining the ISU faculty in 1949 as associate professor of mathematics. He became professor of mathematics in 1955, director of the Computation Center in 1962 and was named professor of computer science in 1968. From 1966 to 1978 he was also assistant program director of the mathematics and computer science division of the Ames Laboratory.

Maple was one of the key figures in the current expansion plans for ISU's Computation Center, designed to provide the University with one of the most modern instructional computing facilities in the nation. He was planning to retire in June 1986.

Maple was the 1984-85 chair-elect of EDUCOM, a consortium of more than 500 colleges, universities and research institutes in the United States and abroad that are heavily involed in the application of computers to teaching and research.

The Clair George Maple Memorial Fund has been established with the ISU Achievement Foundation to support graduate students interested in computing disciplines at ISU.

Vicki Kramer
ISU Computation Center

REPORT FROM THE GOVERNOR
by Donald V. Meyer

I attended the Board of Governor's meeting of the MAA on 1986 as your representative. Since my term ends this June, this is the last Board meeting I will attend as Iowa Governor. It is hard to know which actions of the Board to highlight. I'll try to mention a few which may be of particular interest.

You may recall that the MAA was concerned about the future of the joint summer meetings with AMS because on January 24, 1984, the AMS Council passed a motion favoring the cancellation of joint summer meetings. The MAA asked the AMS to reconsider this issue. In November, 1985, the AMS Executive Committee decided to recommend to the Council on scientific grounds that joint summer meetings be continued indefinitely. This recommendation was approved at the AMS Council meeting on January 6, 1986. We are pleased.

The MAA membership is continuing to increase, gaining over 2,000 members in 1985.

Marcia Sward is on leave from the MAA headquarters effective January 1, 1986. Peter Renz has been appointed Associate Director of the MAA. Peter will assume the editorship of Focus on January 1, 1986, and will subsequently undertake major responsibility for the entire publication program of the Association.

The following people were elected to the respective offices:

Gerald Porter, University of Pennsylvania - Finance Committee member
Rogers Newman, Southern University - Governor at Large, representing Minority Institutions
Edward J. Barbeau, University of Toronto - Governor at Large representing Canadian numbers
Donald L. Kreider, Dartmouth College - Treasurer of the MAA - to fill the unexpired term of Leonard Gillman.
Yousef Alavi, Western Michigan University - Governor of Michigan Section, to fill the unexpired term of George Feeman.
David W. Ballew, South Dakota School of Mines and Technology - Associate Editor of Focus.

Alan Tucker, Chairperson of the MAA Publications Committee, reported that the MAA Publications Program is in excellent shape. Furthermore, editors of the journals reported a healthy backlog of papers for each journal.

The following grants have been received by MAA since August 1, 1985:

1. National Science Foundation: "Analysis of Undergraduate Sciences Programs in Universities, Four-Year Colleges, and Two-Year Colleges, 1985-86." $112,134.

2. Alfred P. Sloan Foundation: "National Study of Resources for Collegiate Mathematics." $18,950.

(Gov's report. cont'd)

Allow me to end by saying "Thank you" for the opportunity to serve. It is interesting to see the MAA in operation; the organization has strong leadership, and it is strengthening its financial base. I feel confident that it will continue to represent the collegiate mathematical community well in the future.

IOWA STATE BOARD OF REGENTS ANNOUNCES TITLE II EDUCATION FOR ECONOMIC SECURITY GRANTS

Recently the Iowa State Board of Regents announced the funding of thirteen grant applications submitted under the Iowa Title II Education of Economic Security Act of 1984 Higher Education Grants. The Act is designed to improve the quality of mathematics, science, foreign language and computer teaching instruction. Eight of the funded projects are mathematics related. Listed below is the director, academic institution, project title, and abstract of each of the proposals that was funded in the mathematics area:

1. Project Director: Jerold C. Mathews, Iowa State University

   Project Title : Summer Fellowships in Mathematics for Secondary Mathematics Teachers

   Brief Abstract : We propose that fifteen fellowships for secondary school mathematics teachers be provided during summer semester 1985 in the Master of School Mathematics (MSM) program at Iowa State University. The MSM program offers opportunities to inservice teachers for improving their teaching skills and their knowledge of the mathematical sciences. The courses in the program are based on and consistent with recent recommendations from national mathematical and education professional organizations.

2. Project Director: Joseph Hoffert, Drake University

   Project Title: Drake/Heartland Training Program for Elementary Mathematics Consultants

   Brief Abstract: This program involves the selection of a cadre of mathematicians to be trained as consultants in elementary mathematics for school districts in the eleven county Heartland Area. Training will be done at Drake University in the summer of 1986. The trained consultants will meet a serious need for such assistance among the schools in the area. Hopefully, the program will create a model that can be used with other disciplines and in other geographical areas.

3. Project Director: Donald V. Meyer, Central College

   Project Title: Discrete Methods in Mathematics

Brief Abstract: Central College proposes an eight-week summer institute for high school and middle school teachers of mathematics. Twenty teachers will be supported, each of whom will enroll in two mathematics courses and a seminar. The goal is to increase the competency of mathematics teachers, give them additional tools with which to challenge their students, and spark their enthusiasm to do mathematics.

4. Project Director: Harold L. Schoen, University of Iowa

   Project Title: The Impact of Discrete Mathematics on the Secondary Schools

   Brief Abstract: Discrete mathematics is an issue that needs to be addressed by Iowa's secondary schools. This proposal is for a summer workshop that would provide an introduction to the content of discrete mathematics, and examination of the potential impact on secondary school mathematics and a careful attempt to incorporate some of the topics into the high school curriculum as appropriate. Seconday school mathematics teacher participants will also plan to deliver in-service sessions on the subject to other teachers in their regions of Iowa.

5. Project Director: Darrel B. Hoff and Robert Ward, University of Northern Iowa

   Project Title: Mathematics and Science Teaching - Educational Revitalization (MASTER)

   Brief Abstract: Based on national studies, local and regional needs assessments and a series of consultative meetings, the University of Northern Iowa is proposing a series of summer short courses for elementary and middle school teachers of mathematics and science. These courses will stress process science and mathematics, development of reasoning skills and content. They will be delivered off-campus at three sites in eastern Iowa during the summer of 1986. Participants will receive a small stipend to cover their travel and meal expenses and no tuition will be charged for the courses. Follow-up evaluations on the effectiveness of the program will be conducted in cooperation with the planning body (which includes teachers and AEA consultants) and the results will be used for planning future programs.

6. Project Director: Jack D. Wilkinson
   University of Northern Iowa

   Project Title: An Inservice Mathematics Program for the Sac and Fox Settlement School

   Brief Abstract: The purpose of this proposal is to conduct a mathematics inservice program at the Sac and Fox Settlement School (preschool to grade 5), Tama, Iowa. The principal and staff at the Settlement School and the project director

have jointly planned three types of activities: a) the project director will make monthly visits to the Settlement School. The purpose of these visits will be to teach, observe teachers and consult with teachers; b) a three-day workshop in May will enable teachers and aids to work on an "effective teaching model" for Native Americans and to make decisions about the selection and modification on instructional materials in mathematics for Native American students; c) during June of 1986 a one-week workshop for the teacher aids, five Native American, will be conducted at UNI. The goal will be to give the teacher aids workshop experience using manipulatives and teaching aids so that they are better able to help teachers and students in the mathematics program at the Settlement School.

7. Project Director: Dr. Glendon W. Blume
University of Iowa

Project Title: Using Computer-based Materials for Mathematics Instruction: A Workshop for Mathematics Teachers.

Brief Abstract: The proposed project offers an intensive summer workshop for in-service middle school/junior high and senior high mathematics teachers. The workshop will prepare teachers to appropriately use commercially available computer-based instructional materials under a variety of conditions and with students of varying abilities.

8. Project Director: Dr. Edward C . Rathmell
University of Northern Iowa

Project Title: A Cooperative Grinnell-Newburg Community School District and University of Northern Iowa Project to 1) Train K-8 Lead Teachers to use Effective Instructional Behaviors to Teach Mathematics and (2) Study the Effects of that Inservice.

Brief Abstract: In an effort to improve mathematics instruction, the Grinnell-Newburg School has identified lead teachers who will be trained by the principal investigator in the use of effective teaching behaviors for mathematics instruction. The effects of that inservice will be evaluated by observing changes in teacher behavior. The focus of the inservice will be to improve both the quantity and quality of developmental instruction. The amount of specificity for inservice as it relates to various content topics will also be studied.

THIRTY YEARS AGO

The Iowa Section of the Mathematical Association of America held its 1956 meeting at Grinnell College, Grinnell, Iowa, on April 20-21, 1956. The program consisted of the following set of papers:

1. Pascal's Arithmetical Triangle
   R. B. McClenon - Grinnell

2. An application of the Functional Equation $f(x + y) = f(x)\ f(y)$ in elementary differential equations.
   L. E. Pursell - Grinnell and R .F. Reeves - Ohio State University

3. Common Elements
   F. A. Brandner - Iowa State College

4. Charts for Zeros of Crons product Bessel Functions
   Don Kirkham - Iowa State College

5. History of the Iowa Section of the M.A.A.
   Fred Robertson - Iowa State College

6. Remarks on Commuting Automorphisms of Rings
   M. F. Smiley - State University of Iowa

7. A Characterization of a Certain Type of Distribution
   R. V. Hogg - State University of Iowa

8. A Certain Limiting Distribution
   Allen T. Craig - State University of Iowa

The abstract of Professor Robertson's paper on the History of the Iowa Section of the M.A.A. reads as follows:

> "The author discussed the formation of the section on April 28, 1916 in Des Moines. The names of the charter members were given.
>
> The minutes of the first meetings were reviewed. The fact that the section has met jointly with the Iowa Academy of Science since its founding and met with the State Teachers Association for the first five years of its existence was emphasized in the discussion of time, place of its meetings.
>
> Changes over the years were shown and hopes for future progress (was) expressed."

TWENTY YEARS AGO

The Iowa Section of the MAA met at Central College, Pella, Iowa on April 15, 1966. Professor D. E. Sanderson of ISU served as chairman, and the following program was given:

Contributed papers:

1. Quasi-algebraic functions. Edward S. Allen, Ames.
2. On order, convergence in partially ordered sets. R. F. Anderson, Ames.
3. Generalized derivatives and integrals. Daniel L. Hansen, LeMars.
4. Approximation of real continuous functions on the real line by infinitely differentiable functions. Lyle E. Pursell, Grinnell.

Panel. A general curriculum in mathematics for colleges (1965 CUPM report). Marion Cornwall, Marshalltown Community College, Marshalltown; J.C. Mathews, Iowa State University, Ames; E. R. Mullins, Grinnell College, Grinnell.

Afternoon Session

1:30-3:30 p.m.

Business Meeting. Election of section officers.

Contributed papers:

5. Locally flat cell-pairs of codimension 2. Tom Price, Iowa City.
6. Chains of different dimensional topologies. Bruce A. Anderson, Iowa City.

Invited Address. Some new results in distance geometry.
Leonard M. Blumentahl, University of Missouri, Columbia, Missouri

Editors Note: Perhaps some of you recall that an angle tri-sector gave a testimonial at this meeting. Somehow that failed to appear in the minutes. It seems appropriate that the testimonial took place at the Central College meeting, since Central is church-related.

THE AMERICAN HIGH SCHOOL MATHEMATICS EXAMINATION

by Elgin Johnston

Many of Iowa's top high school students took the 1985 American High School Mathematics Examination (AHSME). The 90 minute, 30 question, multiple-choice exam was given on February 26, 1985 at 5,912 schools worldwide. A total of 380,072 exams were mailed to participating high schools.

The AHSME is the first of three high school Mathematics exams sponsored by the MAA. Students scoring above 95 (out of 150 possible) were invited to take the American Invitational Mathematics Exam. The AIME is a 3 hour, 15 question exam. This exam, too, is "multiple choice" since all answers on the AIME are integers from 0 to 999 inclusive. A total of 932 high school students from 625 schools across the country took this year's exam (sample questions from this year's AIME appear below.)

Students scoring at least 10 on the AIME were invited to take the United States of America Math Olympiad (USAMO). This year there were 64 USAMO participants (the problems on this year's USAMO appear in the November 1985 issue of Mathematics Magazine). The students performing best on the USAMO were invited to a special training session aimed at selecting a team for the International Math Olympiad.

For AHSME scoring, recognition, and administrative purposes, the United States and Canda is divided into regions. Iowa is in region VII along with Minnesota, North Dakota, South Dakota, Manitoba and Saskatchewan. Several Iowa students and schools received district VII recognition: seniors A. Balinsky (Ames), D. Johnson (Pleasantville), H. Salas (Hempstead, Dubuque) and B. Young (Audubon) were all named to the AHSME Honor Roll. A score of at least 100 is required for this recognition. Freshmen and Sophomores scoring at least 80 were named to the Merit Roll: P. Auh (Heelan, Sioux City), L. Behn, J. Boelter, B. Brown (all of Valley, West Des Moines), M. Hutchinson (Ames), W. Rinderkrecht (Thomas Jefferson, Cedar Rapids) and J. Ruth (Iowa City).

Iowa schools earning regional recognition were Ames, Valley (West D.M.), Wahlert (Dubuque), S. Hempstead (Dubuque), Hartley, Iowa City, Thomas Jefferson (Cedar Rapids) and Pleasant Valley.

This year's AHSME will be given on February 25, 1986. For more information, one can contact the state of Iowa exam co-ordinator: Robert Buckingham, Century Life of America, Heritage Way, Waverly, Iowa 50677.

On December 10, 1985, a new MAA exam for junior high school students was given. The American Junior High School Mathematics Examination (AJHSME) will now be an annual examination for seventh and eighth graders nationwide. The AJHSME is a 40 minute, 25 question multiple choice exam. As of this writing, complete exam results were not available.

Sample AIME problems:

1. How many of the first 1000 positive integers can be expressed in the form

$$[2x] + [4x] + [6x] + [8x]$$

where x is a real number and [z] denotes the greatest integer less than or equal to z?

2. In a tournament, each player played exactly one game against each of the other players. In each game, the winner was awarded 1 point, the loser got 0 points, and each of the two players earned 1/2 point if the game was a tie. After completion of the tournament, it was found that exactly half of the points earned by each player were earned in games against the ten players with the least number of points. (In particular, each of the ten lowest scoring players earned half of her/his points against the other nine of the ten.) What was the total number of players in the tournament?

PROFESSOR SOLOW APPOINTED ASSOCIATE EDITOR

Professor Anita Solow, Grinnell College, has been appointed an associate editor of the Monthly, one of three editors of the Notes section. In this capacity she needs referees. If anyone in the Iowa Section is interested in being a referee, please contact her.

Professor Solow is also the Iowa coordinator of the AWM Speaker's Bureau and is looking for members of AWM who would like to join the bureau. Please contact her for information if you are interested.

DID YOU KNOW THAT

THERE ARE APPROXIMATELY π SECONDS IN A NANOCENTURY?

THE SPACE SHUTTLE GETS ABOUT 4 INCHES TO THE GALLON?

THAT YOU MAY SEND ANY INTERESTING NEWS BITS TO MEYER AT CENTRAL COLLEGE FOR INCLUSION IN THE NEWSLETTER FOR NEXT FALL?

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