

Short paper abstracts

Using the Study of Consciousness in the Mathematics Classroom, Catherine Corini Wadsworth

ABSTRACT: Mathematics have always been aware that mathematics is a product of the consciousness of the mathematician. At Marharishi International University, the relationship between consciousness and mathematics is being explored in order to improve mathematics education at the undergraduate level.

Ancient Mathematical Models, J. Mathews

ABSTRACT: One of the earliest exact sciences was astronomy, which became quantitative through the development in Mesopotamia of several arithmetic models, during the period 500-300 BC. Perhaps inspired by the excellence of these models, several Greek mathematician/astronomers developed geometric models for astronomical phenomena during the next 400-500 years. This talk will begin with a description of a Mesopotamian lunar ephemerides, move to Eudoxus' kinematic model, and conclude with a brief look at the much more complex Ptolemaic model.

Teaching Operations Research, A. M. Fink

ABSTRACT: An applied mathematics course on operations research topics can have several desirable features. It can contain: real applications, computational experience both by hand and machine, constructive mathematical proofs, complete theories, and fun problems. Most textbooks do not include all the topics, but shorter modules are available from UMAP. We discuss the UMAP materials more generally.

Geometrical Diffraction Theory, A. K. Gautesen

ABSTRACT: The geometrical theory of edge diffraction developed by J. B. Keller for acoustics is applied to elastic wave propagation. The basic principles of ray theory are summarized. Examples which compare the theory with exact results are given.

A Statistical Analysis of the Effect of Car Inspection and Maintenance Programs on Ambient CO Concentrations, J. Ledolter

ABSTRACT: The United States Clean Air Act requires that certain states implement emissions inspection and maintenance (I/M) programs to reduce carbon monoxide (CO) and hydrocarbon (HC) emissions in non attainment areas. Two areas, among many others, in which such programs were implemented are the State of New Jersey and the City of Portland. In New Jersey a yearly car inspection started in February 1974; in Portland a biannual inspection program started in July 1975.

In this paper statistical analyses of hourly ambient CO concentrations recorded at several measurement stations throughout New Jersey and Oregon are presented. The objectives are to assess the trend in the CO concentrations and to discuss the effect of the inspection programs. Hourly CO measurements from January 1971 through June 1977 collected at 7 different stations throughout New Jersey, and hourly CO data from 1971 through 1979

at four Portland and one Eugene station are analysed. Wind speed, wind direction, relative humidity, mixing height, precipitation, temperature and traffic counts next to the measurement stations are included in the analyses. Various statistical models including time series methods, intervention techniques and regression models using the meteorological and traffic data are employed in the trend assessment.

The Dynamics of Electoral Competition: A Preliminary Analysis,
William P. Collins and A. F. Kleiner

ABSTRACT: The system of differential equations which produces the Competitive Exclusion Principle in Ecology are used to model competition between political parties for voters. The long term behavior of solutions is classified by one party and two party cases. The problem associated with fitting the model with electoral data is included.

Identifying Comparatively Excessive Sentences of Death: A Quantitative Approach,
George Woodworth

ABSTRACT: The purpose of this article is to demonstrate the utility of quantitative methods in identifying death sentences which violate the eighth amendment or state law because they are what we describe as comparatively excessive.

Terminal Skunk, Irvin Roy Hentzel

ABSTRACT: Skunk is a popular dice game playable by from two to fifteen or more players. It can be played for money or for just the thrill of winning. The strategy is to decide when to quit and when to continue throwing the dice in an attempt to better one's score. I assumed two players are playing Skunk under the additional rule that any player who throws double ones (called a double skunk) automatically loses. Ordinarily a person throwing a double skunk has to start over. In end game Skunk his chances of winning are then less than 0.00935 so this approximation is reasonable close to the original game. I computed the holding numbers, the probability of winning, and the expected value of the game when played with a pot for various size pots.

Enumeration in Music Theory, David L. Reiner

Polya's enumeration theorem will be applied to an enumeration problem in music theory, specifically, the problem of finding the number of chords in various tonal systems under a group action.

Genetic polymorphism in varying environments, J. Cornette

ABSTRACT: We consider an infinite, random mating, diploid population with selection at a single autosomal locus at which there are two alleles A and a. In the u th generation, the ratio of the frequency of A to the frequency of a is denoted by U_n and the selection coefficients are AA α_n ; Aa β_n ; aa γ_n . The transition equations for U_n are

$$U_0 \text{ is given (positive and finite)}$$

$$U_{n+1} = U_n \frac{\alpha_n U_n + \beta_n}{\beta_n U_n + \gamma_n}$$

We give some conditions on α_n , β_n , and γ_n which insure existence of $0 < m < M < \infty$ such that U_n is frequently (or always) in $[m, M]$.

H. A. Levine, Iowa State University

ABSTRACT: Burkhart and his coworkers have observed interfacial (surface) flow patterns on contaminated forming droplets. The number of patterns increases with increasing Reynolds number, there being two patterns in the range 8-24, four patterns in the range 60-150 and six in the range 220-260.

A preliminary analysis of the flow equations indicates that these patterns arise as stationary solutions of a certain nonlinear parabolic differential equation for the contaminant surface density at the interface between the droplet and surrounding medium. Reasonable qualitative agreement with experiment was obtained, both as to the ranges of Reynolds numbers as well as to the qualitative behavior of the surface velocity distributions.

GOVERNOR'S REPORT TO THE IOWA SECTION OF THE
MATHEMATICAL ASSOCIATION OF AMERICA
WILLIAM L. WALTMANN, APRIL 24-25, 1981

Permit me to express my thanks to the members of the Iowa Section for electing me last spring to a three year term as Governor of the Iowa Section of the MAA. This first year has been an exciting new experience for me and has provided me with an opportunity to participate in the business of our national organization. I represented the Iowa Section at two Board of Governors meetings, one in Ann Arbor, Michigan (August 20, 1980) and the other in San Francisco, California (January 8, 1981). Although many important concerns were discussed, I will list only a few items that might interest you.

1. (August 20, 1980) A summary of MAA Section Reports for the year ending May 15, 1980, was distributed and discussed. I sent a copy of this report to Chairperson Arnold Adelberg on September 11.
2. (August 20, 1980) The item which received the most discussion was a motion to cancel the Joint AMS-MAA meeting scheduled for August 1982 because of a schedule conflict with the International Congress or the International Congress on Mathematics Education. This motion was defeated at the January 8th meeting. The Summer 1982 meeting was scheduled for August 23-27 at the University of Toronto in Canada.
3. (January 8, 1981) Alfred B. Willcox, Executive Director of MAA, presented the following membership statistics.

	Jan. 1, 1979	Jan. 1, 1980	Jan. 1, 1981
National	18,500	18,496	18,595
Iowa Section	180	186	181

4. (January 8, 1981) The Board approved the election of the following Nominating Committee for 1981: Harry L. Alder, Chairman; James L. Cornette (Past Iowa Section Governor), and Anne F. O'Neill.
5. (January 8, 1981) The Board approved the following resolution: "The Mathematical Association of America wholeheartedly supports the use of NCTM's 'Guidelines for the Preparation of Teachers of Mathematics' in efforts to strengthen the mathematical preparation of public school teachers and particularly in connection with NCATE accreditation and state certification standards."
6. (January 8, 1981) In order to keep the MAA solvent in 1981 the Board approved an approximate 30% increase in the price of its books and publications. The Board also approved a 1982 dues increase from \$30 to \$40 for a regular member subscribing to the MONTHLY. It was pointed out that the increased dues would be less than that for comparable organizations and the Board asked the Executive Committee to review the dues structure annually rather than on alternate years.
7. (January 8, 1981) The Board heard a progress report on the NSF-funded program "Mathematics at Work in Society". This MAA sponsored project is designed to produce four 20-minute video cassettes and a 30-page "Career Awareness" workbook. The Board viewed the first cassette entitled "What is an Actuary?" which should be available in the fall of 1981. This appears to be worthwhile and a quality effort.
8. (January 8, 1981) President Dorothy L. Berstein was thanked for her service to MAA as her term ended at the conclusion of the San Francisco meeting. President-Elect Richard D. Anderson participated in the Board meeting and was introduced.

Joint Meetings of the Iowa Sections of MAA, ASA, SIAM

Union, Coe College, Cedar Rapids, Iowa

April 24 - 25

Friday, April 25 Room D, Union

- 1:30 Registration
- 2:00 C. G. Wadsworth, Maharishi International University,
Using the Study of Consciousness in the Mathematics Classroom.
- 2:30 J. C. Mathews, Iowa State University,
Ancient Mathematical Models of Celestial Motion
- 3:00 Break
- 3:15 H. A. Levine, Iowa State University, A Model for the Flow of
Surfactants on the Interface of Forming Droplets.
- 3:45 A. M. Fink, Iowa State University, Teaching Operations Research
at the undergraduate level and use of UMAP materials.
- 4:14 P. V. Meyer, Central College, Survey results: Responses of a question-
naire from Mathematics Faculty of the liberal arts college in Iowa.
- 4:45 Governor's report
- 7:30 (Tentative) MAA Film show.

Saturday, April 25 Room D, Union

- 8:00 Coffee and donuts
- 8:30 R. V. Hogg, State University of Iowa, Robust Statistical Methods
- 9:30 R. D. Anderson, Louisiana State University and President of MAA.
Some Algorithmically Defined Functions
- 10:30 Break
- 10:45 J. C. Kegley, Iowa State University, An Asymptotic Stochastic
View of Split-second Hesitation
- 11:20 Business Meetings
- 1:30 W. R. Madych, Iowa State University, On "optimal" reconstruction
algorithms in computed tomography.

CONCURRENT SESSIONS

Room D

- 2:30 Panel: Redesigning the undergraduate curriculum in the Mathematical
Sciences: the impact of computers. Moderator: William Waltman,
Wartburg College.
- 3:30 I. R. Hentzel, Iowa State University, Terminal Skunk
- 4:00 D. L. Reiner, Grinnell College, Enumeration in Music Theory
- 4:30 J. Cornette, Iowa State University,
Genetic polymorphism in varying environments

Room B

- 2:30 A. K. Gautesen, Iowa State University, Geometrical Diffraction theory
- 3:00 K. E. Atkinson, State University of Iowa, Integration on Spheres
- 3:30 G. Woodworth, State University of Iowa, Identifying Comparitively
Excessive Sentences of Death: A quantitative approach
- 4:00 A. F. Kleiner, and W. P. Collins, Drake University,
The dynamics of Electoral competition: a preliminary analysis.
- 4:30 J. Ledolter, State University of Iowa, A statistical analysis of
the effect of car inspection and maintenance programs on
Ambient CO concentrations.