The Kansas Section of the Mathematics Association of America

Section Meeting
March 26-27, 1999
Manhattan, Kansas

Meeting Program

Friday

7:00pm, Registration, Main Lobby of Cardwell Hall

7:30pm, Keynote Address, Room 102, Deborah Hughes-Hallett, University of Arizona, *Understanding Students: Mathematics from Another Angle*

8:30pm, Reception, Room 121

Saturday

7:15am, Breakfast for Departmental Representatives, Gold Fork Restaurant (at the Ramada Inn)

8:30am, Registration, Main Lobby of Cardwell Hall. The organizers are grateful to Academic Systems for sponsoring the refreshments Saturday morning.

9:00am, Contributed Talks

- Session on Teaching Algebra, Room 102
  - Don Haussler, Kansas City Kansas Community College, *Use of Computerized Instruction in Basic Math and Basic Algebra*
- Session for General Interest Talks, Room 144
  - Prem Bajaj, Wichita State University, *Humor in teaching mathematics*
  - Jeff Poet, Ottawa University, Using Flatland in college geometry

- Session for Graduate Student Talks, Room 143
    - Peter Zimmer, University of Kansas, *Numerical Methods for the Stochastic Heat Equation*
    - Mihaela T. Matache, University of Kansas, *Analysis and Modeling of ATM cell traffic.*

10:00am, Break.

10:30am, Contributed Talks

- Session on Teaching Algebra, Room 102
    - Nora Strasser, Friends University, *Using email and web-based quizzes to teach Algebra*
    - M. Gail Leedy, Department of Social Work and Donna E. LaLonde, Department of Mathematics and Statistics, Washburn University, *Conflict Resolution: A Necessary Step in Mathematics Education Reform*

- Session for Talks of General Interest, Room 144
    - Cynthia Woodburn, Pittsburg State University, *Pascal's Triangle - Color Me Beautiful*
    - Charles Moore, Kansas State University, *Random walks and sums of sines and cosines.*

- Session for Graduate Student Talks, Room 143
    - Indra B. Kshattry Wichita State University, *Pay Back Society, a new concept.*
    - Darius Amani-Taleshi, The University of Kansas, *Application of the instantaneous frequency in characterizing cochlear nonlinearity in normal and pure-tone damaged ears.*

11:45am Luncheon, Student Union, Flint Hills Room

- Presentation of Distinguished Teacher Award to Al Riveland
- Deborah Hughes-Hallett, University of Arizona, *The Role of Symbolic Manipulation*

1:30pm, Contributed Talks

- Session on Teaching Algebra, Room 143
    - G. P. Youvaraj, Emporia State University, *An Experiment with 5 days. College Algebra for weaker students.*
    - Tim Flood, Pittsburgh State University, *A Longitudinal Study of the Effects of Integrating Developmental algebra with College Algebra*

- Session for Talks of General Interest, Room 144
    - Elwyn H. Davis, Pittsburgh State University, *Judging the Judges - or How to get consensus from experts*
    - Philip G. Kirmser, Kansas State University, *Is the modeling of reality mathematics?*

- Session for Undergraduate Student Talks, Room 102
    - Kevin Hooker, Jeremy Keiling, and Michael Scott, Baker University, *Analysis of a scheduling problem*
    - Jeremy Dill, Pittsburgh State University, *Digital Invariants*

2:45pm, Business Meetings

- MAA, Room 144
- KMATYC, Room 143

Abstracts of Talks

Friday

7:30-8:30pm, Keynote Address, Room 102

Deborah Hughes-Hallett, University of Arizona,
Understanding Students: Mathematics from Another Angle
Effective teachers know both their subject and their
audience. As students arrive with goals and backgrounds
that differ markedly from our own, how should we adjust?
Should we adjust at all? How do we arrange to keep the
good, and discard the unecessary? Indeed, how do we tell
which is which, since we do not all agree? In this talk I will
talk about how I think students have changed, and how we
might respond.

Saturday

9:00-10:00am

Session on Teaching Algebra, Room 102

Don Haussler, Kansas City Kansas Community College, *Use of
Computerized Instruction in Basic Math and Basic Algebra*
The following outline is very tentative and subject to
change.
1. History of Students in Basic Math and Algebra
2. Type of students serviced in Basic Math and
   Algebra
3. What precipitated the change in the delivery of the
   course
4. The 1998-99 Version of Basic math and algebra
5. Future Plans for use of the new delivery system

<center>**10:30-11:30am**</center>

Session on Teaching Algebra, Room 102

Nora Strasser, Friends University, *Using email and web-based quizzes to teach Algebra*

> During the Fall of 1998, an Algebra course was offered that used email to deliver the lessons and web-based quizzes. This talk will be on how successful the course was, and what problems occurred. A demonstration of the Asymetrix Toolbook and construction of the quizzes will be included.

M. Gail Leedy, Department of Social Work, and Donna E. LaLonde, Department of Mathematics and Statistics, Washburn University, *Conflict Resolution: A Necessary Step in Mathematics Education Reform*

> The literature which studies the webs of our belief is rich and has been used to motivate changes in educational practice. The mathematics education community has studied, in some detail, how gender affects learning styles and how belief structures affect preservice and inservice teacher practice. This and other related research has informed the ongoing mathematics education reform movement. The focus of our work is to examine how beleif conflcits of teachers, parents, and children influence the teaching and learning of mathematics. We will do this by presenting a preliminary analysis of quantitative and qualitative data collected from boys and girls who participated in a regional mathematics contest, their parents, teacher-coaches, and other teachers. We will discuss some interesting results about the beliefs held by these groups, the conflicts which arise from these beliefs, and offer some suggestions about how the resolution of these

conflicts may improve the quality of mathematics eduction.

Session for Talks of General Interest, Room 144

Cynthia Woodburn, Pittsburg State University, *Pascal's Triangle - Color Me Beautiful*

Beautiful patterns arise if one considers Pascal's triangle mod n, where each of 0,...,n-1 is replaced with a different color. One can also generate triangles by using groups other than Z_n. We will look at several examples and investigate how the group structure affects the patterns which appear in the triangles. (Based on work by Kathleen M. Shannon and Michael J. Bardzell of Salisbury State University)

Charles Moore, Kansas State University, *Random walks and sums of sines and cosines.*

Stand at the origin on the real line. Flip a coin; if it comes up heads move right one step, if it is tails, move left. Continue. Polya showed that with probability one, this random walk returns to the origin an infinite number of times. Viewed in the right way, this is just a theorem about sums of certain functions (the Rademacher functions). In this talk we will discuss all of this as well as random walks formed using trigonometric functions; under certain conditions, these behave like coin flips.

Session for Graduate Student Talks, Room 143

Indra B. Kshattry, Wichita State University, *Pay Back Society, a new concept.*

"Those who help others, help themselves"
In this sense, those who volunteer get a lot of fun. Mother Terressa gave her life for others' cause. Those who get help should also help others, in a way they are asked to 'Pay Back'. We experimented this fact in Math Lab at WSU. More details will be given.

Session for Talks of General Interest, Room 144

Prem Bajaj, Wichita State University, *Humor in teaching mathematics*

> Humor plays an important part in teaching of Mathematics. In this talk, examples will be given where intricate points in Mathematics can be "explained" to a student. Obtaining the correct answer to a problem is not enough - you need a SOLUTION to the problem. Even Russell Cosby, brother of Bill Cosby, had a difficult time understanding why getting the answer did not get him full credit for the problem.

Jeff Poet, Ottawa University, *Using Flatland in college geometry*

> One difficulty that students encounter in non-Euclidean geometry is that they enter the course not realizing that much of what they have learned in high school is based on an assumption about parallelism. This talk will focus on the impact of the use of Edwin Abbott's _Flatland_ in my geometry classroom and on my students' reactions to the book.

Session for Graduate Student Talks, Room 143

Peter Zimmer, University of Kansas, *Numerical Methods for the Stochastic Heat Equation*

> Talk will show the analytic solution to the stochastic heat equation (heat equation with additive noise [zero=mean, sigma= variance]). The talk will proceed with showing a variety of finite difference numerical schemes to numerically solve the stochastic heat equation. Conclusions will include example problems solved (initial valued problems with either Dirichlet or Neuman boundary conditions) with

1. How does the mesh size effect the numerical solution.
2. How does the "amount" of noise effect the numerical solution.

Mihaela T. Matache, University of Kansas, *Analysis and Modeling of ATM cell traffic.*

This talk describes a study of ATM (asynchronus transfer mode) cell data considering both the analysis and the modeling of the data. For the data analysis portion of the work, cell counts per unit time are done and interarrival times between cells are determined. Source modeling is done for the large VBR (variable bit rate) users and a CBR (constant bit rate) user from the dat. From the empirical distribution of the interarrival times, the source modeling is made by a sequence of pairs of random variables (X,Y) where X represents the cell bursts and Y represents the interarrival times between bursts. Within each burst, the distribution of cells is determined by a finite state Markov chain, and the interarrival times of the bursts are also determined by a different finite state Markov chain. As an alternative, the interarrival times of the bursts are made dependent on the previous burst size. This model is used to fit a given rate process per unit time. The model is validated by comparing the interarrival times of the model and of the trace data, as well as the corresponding rate processes. The analysis of the queue in the buffer is done by computing the sample mean, variance and maximum of the buffer usage. Quantiles of the tail of the queue are also determined, as well as mean cell delays and cell loss ratios. The model's characteristics are typically similar to the data's characteristics.

Darius Amani-Taleshi, The University of Kansas, *Application of the instantaneous frequency in characterizing cochlear nonlinearity in normal and pure-tone damaged ears.*

In response to both single and two-tone stimuli, spectral analysis of the cochlear microphonic (CM) yields harmonic and intermodulation distortion products (CMDPs). The presence of CMDPs indicates that the processes involved in cochlear mechano-electrical transduction (MET) are nonlinear, however the physical meaning of CMDPs is difficult to interpret. An alternative method to obtain insight into MET, is to examine the CM in terms of its instantaneous frequency (IF). The IF is the derivative of the phase of the Hilbert transform of a time domain signal and represents the "angular ve!

11:45am-1:15pm, Luncheon Address, K State Student Union

Deborah Hughes-Hallett, University of Arizona, *The Role of Symbolic Manipulation*

The day when students have easy access to computer algebra systems is just around the corner. What difference will this make to what we teach? To what students learn? How do we tell what manipulations students should still learn to do by hand? In this talk I will suggest a way of organising the discussion on these difficult but urgent questions.

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1:30-2:30pm

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Session on Teaching Algebra, Room 143

G. P. Youvaraj, Emporia State University, *An Experiment with 5 days. College Algebra for weaker students.*
> To help the students who are weaker in algebra, we have designed a course which meets 5 days a week. Analysis of the data collected from this study will be discussed.

Tim Flood, Pittsburgh State University, *A Longitudinal Study of the Effects of Integrating Developmental algebra with College Algebra*
> Colleges and universities are constantly looking for new ways to package their courses in an attempt to better serve the students. One particular example of this is offering some form of remediation in the same semester in which the student takes College Algebra. The results of an in-depth study of the benefits and consequences of such a delivery system will be presented. The information presented will be beneficial to any deparmtnet considering implementing or modifying this type of system.

Session for Talks of General Interest, Room 144

Elwyn H. Davis, Pittsburgh State University, *Judging the Judges - or How to get consensus from experts*
> If several experts rank something how can a final summary ranking be reached? A set of axioms for a geometry which can be used to solve this problem is presented. The axioms were created by John Kemeny. The audience will participate in working with randings of three things.

Philip G. Kirmser, Kansas State University, *Is the modeling of reality mathematics?*

The relationship between mathematics and descriptions of the real world are examined using two cases from engineering.

Session for Undergraduate Student Talks, Room 102

Kevin Hooker, Jeremy Keiling, and Michael Scott, Baker University, *Analysis of a scheduling problem*

Woodley Building Maintenance is a company in Kansas City, MO that provides cleaning services for businesses in the greater KC area. To reduce worker turn-over, the company wants to convert more of its part-time workers to full-time status. Time constraints on when its workers can start and transport difficulties have led the company to consider leasing a fleet of vans to transport its workers from job site to job site. Our task was to locate several drop off/pick up points; to maximize the number of full- time workers required by the company to meet its contractual obligations; and to produce a van schedule consonant with the job assignments of the company workers.

Jeremy Dill, Pittsburgh State University, *Digital Invariants*

There is an interesting property of the numbers and powers that follow the process: take any number, take the sum of the squares of its digits, repat this process and eventually you will obtain a 1 or 58 every time. 58 is not unique but an element of a larger loop system. I have extended this idea to higher powers and found some interesting results. A proof of the existence of these Digital Invariants will also be given.