6th Annual Greater Kansas City

MATHEMATICS TECHNOLOGY EXPO

October 4 - 5, 1996
at Kansas City Kansas Community College

We welcome the Kansas City Professional Development Council (KCPDC) as a new supporter of the Greater Kansas City Mathematics Technology EXPO.

Schedule of Events and Abstracts

Registration
Theater: Friday 8:00 a.m. - 11:30 a.m.
"Central Area": Friday 11:30 a.m. - 2:00 p.m. and Saturday 8:00 a.m. - 1:00 p.m.

Continental Breakfast
A complimentary continental breakfast is available Friday in the Lobby, and on Saturday in the "Central Area."

Lunches
Lunch is available both Friday and Saturday for those that have prepaid.
Friday lunch consists of a buffet of salad, sandwiches, pop, and cookies.
Saturday's lunch is a taco bar, cookies, and lemonade or tea.
A few extra meals are available. Check at the registration table if you wish to purchase a lunch.

Technology Display Area - Room 3619
Friday 10:30 a.m. - 3:30 p.m., and Saturday 9:00 a.m. - 10:00 a.m., 11:00 a.m. - 2:00 p.m.
Hands-on Calculators (Casio, HP, Sharp, TI) and Hands-on Displays of Mathematics Software (Cabri, Converge, Derive "Classic," Derive for Windows, Geometer's Sketchpad, Advanced GraphsGraphsGraphs, Green Globs, Gyrographics, Mathematica, Matlab, MPP, MPP 3D, MicroCalc, Ubasic, University of Arizona Software)

Textbook, Hardware, Software Vendors - "Central Area"
Friday 11:30 a.m. - 2:30 p.m. and Saturday 8:00 a.m. - 11:00 p.m.
Addison Wesley, Advantage Marketing Inc., Business Media Inc., Harcourt Brace, Houghton-Mifflin, International Thomson Publishing, MAA books, Prentice Hall, TCI (Scientific WORD), Texas Instruments, Wiley

NOTE: The Technology Display Area and the Vendor Area are both open on Friday following the keynote and on Saturday.

Welcome and Introductions

9:00 a.m., Friday
Theater
Libby Holmgren, 1996 EXPO Planning Committee Chair, Johnson County Community College, Overland Park, KS
Dr. John Garmon, Vice President of Academic Services, Kansas City Kansas Community College, Kansas City, KS

SESSION 1
Keynote Address

How Modern Software Has Revolutionized Calculus Instruction

Stan Wagon, Macalester College
e-mail: wagon@macalester.edu
web page: http://www.math.macalester.edu/~wagon
Author of Mathematics in Action, co-author of Animating Calculus, former columnist for the Mathematical Intelligencer
(Business Media, Inc. is providing the projection device and Apple Computer Inc. is providing the PowerMac for the keynote address.)

High powered software has had a major impact on the way our speaker views and teaches calculus. He will discuss the innumerable ways in which this has happened. In particular, he will show how *Mathematica*'s power and breadth allow us to take completely different views of things. Some examples:
The Fundamental Theorem of Calculus
Simulating Real World Problems
Important Ideas of Numerical Computation

SESSION 2
10:30 a.m. - 11:20 a.m., Friday

2A. Room 3508
Technology and Geometry: The 6 Keys to Success
David Ewing, Central Missouri State University, Warrensburg, MO

Actively learn to teach Geometry through the "6 Keys to Success." Several practical, classroom tested (grades 2 - 16) lessons will be presented using software like the *Geometer's Sketchpad*, *Cabri Geometry*, and *Geometry Toolkit*. The presentation includes do's and don'ts along with valuable advice and resources. Regardless of previous experience or knowledge, these demonstrations will be of interest and importance to you and your students.
Presider: Nic LaHue, Penn Valley Community College, Metropolitan Comm. Colleges, Kansas City, MO

2B. Room 3509
EXPO Showcase: Comparison Between "Derive for Windows" and "Classic Derive"
Richard Delaware, University of Missouri - Kansas City, Kansas City, MO;
Ken Eichman, Blue Springs Campus, Metropolitan Community Colleges, Kansas City, MO

This is a session presented by members of the Math EXPO committee to showcase new technology and to compare with existing technology. This is not a keystroke oriented tutorial. The purpose of this session is to highlight the unique and different aspects of the two Derive versions.

2C. Room 3510
Using "Converge" to Teach Calculus
Carl Anderson and Nancy Olson, Johnson County Community College, Overland Park, KS

This session will demonstrate ways that the speakers have used "Converge" in teaching Calculus,

including differentiation, integration, surfaces of revolution, and contour mappings.
Presider: John Koelzer, Rockhurst College, Kansas City, MO

2D. Room 3617 ***New Technology in Statistics: Now What Do We Teach?***
Jeff Frost, Johnson County Community College, Overland Park, KS

With the availability of statistical programs, and now with the addition of the TI-83 calculator, many of the tasks we need to perform in an introductory statistics class can be done with the touch of a button. What is it, then, that students should learn? How can we use the new technology to reinforce important concepts? This presentation will address these (and other) questions and will also focus on some uses of the TI-82 and TI-83 calculators and the software *Minitab* in teaching concepts in statistics.
Presider: Martha Haehl, Maple Woods Community College, Metropolitan Comm. Colleges, K.C., MO

2E. Room 3618 ***But I Took Math So I Wouldn't Have to Write! Writing Projects for Calculus Students***
Marian VanVleet, Saint Mary College, Leavenworth, KS

The talk will focus on successes and failures with various calculus projects, and various approaches to assigning projects, offering insights gained over the last four years of experimenting with "Writing Across the Curriculum." Topics will include:

Group versus individual projects
Group versus individual write-ups
Development of students' mathematics writing skills
Incorporation of technology in solving problems
Use of technology in writing the final paper
Assessment of student work

Resources for project problems and samples of student work will be available for viewing. Handouts will include samples of problems assigned in Calculus I and Calculus II classes. The process of importing a *Derive* graph into a Word document will be demonstrated. Participants will have a chance to experiment with the Equation Writer provided time allows.
Presider: Brian Balman, Johnson County Community College, Overland Park, KS

Room 3619 Technology Display Area is OPEN.

SESSION 3
11:30 a.m. - 12:20 p.m., Friday

These five discussion groups are organized by the 1996 EXPO Planning Committee to encourage conversation about the larger questions of teaching mathematics with technology. They are not formal presentations, and each moderator is present largely to keep the discussion moving and productive. We encourage participants to continue the group into the lunch hour and suggest that each group could pass around a sign-up sheet for those who wish to keep in touch after the EXPO.

3A. Room 3506 ***What Are Cost-Effective Ways to Introduce Technology at Your School: Rent, Buy, Loan, Share, Surf?***
Moderator: Nic LaHue, Penn Valley Community College - Metropolitan Comm. Colleges,K.C., MO

3B. Room 3508 ***Are New Mathematics Teachers Being Trained in Technology? Can They Be Catalysts for Change?***
Moderator: Martha Haehl, Maple Woods Community College - Metropolitan Comm. Colleges, K.C., MO

3C. Room 3509 ***"AMATYC Crossroads in Mathematics - Standards for Introductory College Mathematics Before Calculus" What Now?***
Moderator: Carolyn Neptune, Johnson County Community College, Overland Park, KS

3D. ***What Will We Do With the TI-92? A Discussion of the Future***
Room 3511-12 Moderator: Richard Delaware, University of Missouri - Kansas City, Kansas City, MO

3E. ***90's Technology: How Can You Keep Them Down on the Farm After They've Seen Paree?***
Room 3617 Moderator: Marian VanVleet, Saint Mary College, Leavenworth, KS

Room 3619 Technology Display Area is OPEN.

LUNCH
located in the Downstairs Area
12:30 p.m. - 1:20 p.m.

Room 3619 Technology Display Area is OPEN during lunch, though lunch is not allowed in the TDA.

SESSION 4
Starting at 1:30 p.m., Friday

4A. ***WORKSHOP: Graphing the Solution of a Single Differential Equation or System of Differential***
Room 3510 ***Equations on a TI-85 Graphics Calculator*** (90 minutes)
William Rant, Lincoln University, Jefferson City, MO

A sequence of applied examples will be given to demonstrate how to graph solutions of a differential equation or a system of differential equations using the differential equation mode of the TI-85. Higher order differential equations must be entered as a system of differential equations. Most of the examples will be applications one encounters in an introductory differential equations class. The goal is that participants will solve the problems presented and leave with the ability to solve differential equations graphically.
NOTE: Thirty TI-85 calculators will be available for this workshop.
Presider: Carl Anderson, Johnson County Community College, Overland Park, KS

4B. ***WORKSHOP: Introduction to the TI-92: Using a CAS (Computer Algebra System) in the Teaching***
Room 3511-12 ***and Learning of Mathematics*** (2 hours)
L. Carl Leinbach, Gettysburg College, Gettysburg, PA

The TI-92 is a major advance in graphing calculators. The addition of the CAS (Computer Algebra System) has given students the ability to handle difficult symbolic manipulations. In this workshop we will tour some of the TI-92's features within a problem solving context. We will also discuss the effect that this device can have upon what we do in our classrooms.
NOTE: Thirty TI-92 calculators will be available for this workshop.
Presider: John Koelzer, Rockhurst College, Kansas City, MO

4C. ***Calculators in an Arithmetic Class??? The Question is How, not Whether*** (50 minutes)
Room 3617 Martha Haehl, Maple Woods Community College, Metropolitan Community Colleges, Kansas City, MO

The presenter will demonstrate specific activities and exercises that have been developed to have students discover and understand the concepts and processes of arithmetic, percentages and ratios. Included will be activities that use visualization, manipulatives, estimates and calculators. Students learning from this approach make estimates and then check the answers on a calculator. Students learn efficient use of the calculator. Students also learn to work with real data -- whether that be data taken from the internet or collected from their daily mathematical experience or needs at home.
Presider: Ken Eichman, Blue Springs Campus - Metropolitan Comm. Colleges, K.C., MO

4D. ***WORKSHOP: Preparing Mathematical Web Sites*** (2 hrs.)
Room 3618 Andy Bennett, Kansas State University, Manhattan, KS

This workshop will cover strategies for building web pages with mathematical content. The speaker will briefly go over the basics of creating a web page and then discuss topics of particular interest to mathematics teachers. Questions to be covered include: What are tricks for putting mathematical formulas on a web page? How do you create mathematical illustrations in a format suitable for a web page? How can you put animations on a web page?
NOTE: Andy prepared and maintained the 1996 Math EXPO Web Site:
http://www.ksu.edu/~bennett/expo.html
Presider: Cheryl Winter, Blue Springs Campus - Metropolitan Comm. Colleges, K.C., MO

4E. ***Technology Display Area Tour***
Room 3619

SESSION 5
2:30 p.m. - 3:20 p.m., Friday

5A. ***Telephones and Algebra***
Room 3617 Elizabeth Appelbaum, Shawnee Mission, KS

Do students yawn at problems about upstream and downstream rowboats? Do Boyle's Law and Ohm's Law leave them cold? The National Council of Teachers of Mathematics says that applications of mathematics are important, yet too many applications in textbooks are esoteric, complicated, obsolete, or academic. Cellular telephones and their rates are a trendy application that may interest students.This example can be used to show the connections among applications, functions, graphs, and equations. (This paper was accepted by the Mathematics Teacher.)
Presider: Cathleen O'Neil, Johnson County Community College, Overland Park, KS

5B. ***Technology Display Area Tour***
Room 3619

Post-SESSION
3:30 p.m., Friday

Room 3508 KAMATYC (Kansas Mathematical Association of Two Year Colleges) will have an informal meeting, and may adjourn to supper.

Room 3509 MOMATYC (Missouri Mathematical Association of Two Year Colleges) will have an informal meeting, and may adjourn to supper.

Saturday, October 5, 1996

SESSION 6
9:00 a.m. - 9:50 a.m., Saturday

6A. Room 3508

Integrating Technology Into the High School Geometry Curriculum
Chuck Harris, Truman High School, Independence School District, Independence, MO

Technology and the mathematics curriculum should fit hand in hand. This year two sections of Geometry at Truman High School integrated a program called *The Geometer's SketchPad* and its related materials into the course. This demonstration will show a few of the activities included in the course. A byproduct of this new focus is a greatly increased use of cooperative learning techniques that are encouraged by the support materials. Though this will be a demonstration, a walk-through of a typical SketchPad day will be presented.
Presider: David Ewing, Central Missouri State University, Warrensburg, MO

6B. Room 3509

EXPO Showcase: Comparison Between the TI-82 and the New TI-83
Libby Holmgren and Carl Anderson, Johnson County Community College, Overland Park, KS

This is a session presented by members of the Math EXPO committee to showcase new technology and to compare with existing technology. This is not a keystroke oriented tutorial. Aspects of the TI-83 that are exactly the same as the TI-82 will not be covered. Instead, the purpose of this session is to highlight the new and unique characteristics of the TI-83 as compared to the TI-82.

6C. Room 3510

A Newly Discovered Property of Ellipses: Is Star Trek's PHASER Imminent?
Richard Delaware, University of Missouri - Kansas City, Kansas City, MO

In this expository talk, the speaker will prove and demonstrate a new focusing property of the ellipse (and ellipsoid) discovered only in 1994 by mathematician Marc Frantz, who one might say, boldly went where no one had gone before. His question was, "What's the long-term behavior of a light ray inside an ellipse passing through a focus and continuing to reflect?" Mathematical software helps with the proof, and software "movies" make the result easy to visualize with dramatic effect. Luckily this fact is elementary enough to be easily incorporated into an Analytic Geometry or Calculus course, and who knows, maybe one of your students will use it to construct the first PHASER!
Presider: Steve Wilson, Johnson County Community College, Overland Park, KS

6D. Room 3617

Using "Gyrographics" to Teach Calculus III
Sandra S. Crumet, Garden City Community College, Garden City, KS

Gyrographics is an animated "real-time" 3-D graphics package which allows 360 degree rotation of a structure in both horizontal and vertical planes, zoom-in or zoom-out on a structure, and pan across a structure. Demonstrations using *Gyrographics* will show how visualization of 3-D structures can help in teaching Calculus III concepts. Demonstrations will include (as time permits): Space curves; tangent, normal, velocity and acceleration vectors; surfaces, c-levels, and gradient vectors; vector field; limits and discontinuities; extrema, both free and constrained.
Presider: Sharon Hamsa, Longview Community College - Metropolitan Comm. Colleges - K.C., MO

6E. Room 3618

Teaching Mathematics Using the Internet
Tim Chappell, North Central Missouri College, Trenton, MO

The Internet brings many resources to your desktop . . . if you only know where to find those resources. A

focus of a 1996 Eisenhower project was to create a list of mathematics and science Internet sites. Each site on this list was carefully selected by participants during the workshop. Anyone, regardless of their net searching abilities, can locate useful, interesting, and current mathematics resources with the help of this list. Each participant also created 2 activities for the classroom that utilized the Internet as a teaching tool. These sites and activities will be discussed in this session.
Presider: Nic LaHue, Penn Valley Community College - Metropolitan Comm. Colleges, K.C., MO

Room 3619 The Technology Display Area is OPEN.

SESSION 7
INVITED SPEAKER
10:00 a.m. - 10:50 a.m., Saturday

Mathematical Literacy - An Update for the Beginning of the 21st Century

L. Carl Leinbach
Author of Calculus Laboratories using *Derive*, member of the Board of Editors for the International *Derive* Journal, software review editor for the College Mathematics Journal

Mathematical literacy is a term whose definition is dictated by the mathematical needs of society and the tools that are available to assist in doing mathematics. Given this volatile term and the goal that students leaving secondary school be mathematically literate, what strategies should we use to prepare our students for life after secondary school? The presence of technology provides our students with the opportunity to tackle problems that may have been well beyond their grasp in previous times. In this presentation, we will consider three detailed examples of how technology, in particular a Computer Algebra System like *Derive*, can be used to assist students and expand their capabilities to do meaningful problem solving and mathematical analysis.
Presider: Kay Weiss, Kansas City Kansas Community College, Kansas City, KS

SESSION 8
11:00 a.m. - 11:50 a.m., Saturday

8A. Room 3508 ***A Vision for College Algebra - Raising the Lower Bound***
Therese Blyn, Garden City Community College, Garden City, KS

This session will be a sharing/discussion of the Kansas statewide College Algebra Symposium held in May of 1996 at Garden City Community College. Our speaker was the organizer of the Symposium about which she speaks today. Goals of the symposium include exploring innovations in the teaching of College Algebra and moving beyond College Algebra as the general education requirement. In September, our speaker attended, "Making Connections Between Business, Education and Technology" - which involved a leadership team of 20 math and science instructors from each of 7 states. She will share from this experience as well.
Presider: Carolyn Neptune, Johnson County Community College, Overland Park, KS

8B. Room 3509 ***The Mathematics Technology Classroom - Successes, Surprises, and Serendipity***
John Koelzer and Anita Salem, Rockhurst College, Kansas City, MO

The presenters will describe the design and implementation of a Mathematics Technology Classroom and the educational advantages they hoped to obtain from it. The presenters found that, after teaching in the Mathematics Technology Classroom for a short time, their teaching style changed in ways that were unanticipated when the room was conceived. This talk will focus on the changes in pedagogy and content that we were seeking, and the progression of events that motivated us to move from one hour of lab per week to the current seamless lecture-lab delivery of calculus and of college algebra & trigonometry.

Examples of curricular materials designed specifically around the technology in the room will be demonstrated. Technical information regarding the physical layout and equipment component of the classroom will be provided. Issues of funding, building and maintaining a technological learning environment will also be included.
Presider: Libby Holmgren, Johnson County Community College, Overland Park, KS

8C. ***A Mathematica'l Tour of the Turn of the Century***

Room 3510 Stan Wagon, Macalester College, St. Paul, MN
e-mail: wagon@macalester.edu Web page: http://www.math.macalester.edu/~wagon

Several examples will be presented of how modern hardware and software, and the powerful, visualization tools that are available, shed new light on mathematical ideas, both classical and modern. Examples will include:
A computer's view of the Banach-Tarski paradox
A new formula for pi
New visualization and computational ideas for ordinary differential equations
New moats in the Gaussian primes
A fascinating algorithm of number theory, and its connection to salt
Space-filling curves, with a surprising application for truck drivers
Presider: Carl Anderson, Johnson County Community College, Overland Park, KS

8D. ***Non-Linear Regression Techniques May Not Produce Best Fit Curves***

Room 3617 Steve Wilson, Johnson County Community College, Overland Park, KS

Technological advances have motivated the inclusion of regression topics in college algebra and pre-calculus. These changes may be occurring without an appropriate examination of the roots of these topics. The speaker shall exhibit a data set for which one particular non-linear regression fails to produce the curve of best fit (as defined by the Least Squares Criterion), and explore some implications. (TI-82)
Presider: Donna Bullock, Central High School, KCMSD, Kansas City, MO

8E. ***Look Mom, No Lecture! or The Development of Computer Guided - Activity Based Instruction for a General Physical Science Course***

Room 3413 Gerald Hodgson, Kansas City Kansas Community College, Kansas City, KS

The author has developed interactive instructional materials for a General Physical Science course that are all available through the Academic Computing network at KCKCC. The students are required to attend a scheduled (7 hour per week) class, but during that time, the students work in small groups through the software, punctuated by frequent activities that illustrate the physical phenomena described. The instructional materials are not meant to replace but to supplement their required text. This format encourages the students to read and discuss the materials in their small (2 or 3) groups. The software is available in any of the Academic Computing laboratories on campus which allows any student missing class to make up their instruction outside class time.
Presider: Kay Weiss, Kansas City Kansas Community College, Kansas City, KS

Room 3619 The Technology Display Area is OPEN.

LUNCH
located in the Downstairs Area
12:00 p.m. - 12:50 p.m.

Room 3619 The Technology Display Area is OPEN, though lunch is not allowed in the TDA.

SESSION 9
1:00 p.m. - 3:00 p.m., Saturday

9A. Room 3508

WORKSHOP: Teaching College Algebra as a Lab Course

Judith Stubblefield and Sandra S. Crumet, Garden City Community College, Garden City, KS

Students discover the power and utility of algebra by visualizations, analyzing, and reporting on data they collect in a laboratory setting. They have fun doing mathematics through collaborative activities modeled after the AMATYC Standards. Students use graphing calculators (we'll use the TI-82), a CBL, and interactive course software to explore concepts and make algebra "real." In addition to sharing information on the course materials, we would like to have the attendees experience a typical class session. No prior experience with the TI-82 is assumed, and those who consider themselves novices will be teamed with more experienced users.
NOTE: Thirty TI-82 calculators will be available for this workshop.
Presider: Martha Haehl, Maple Woods Community College - Metropolitan Comm. Colleges, K.C., MO

9B. Room 3510

WORKSHOP: Interactive Notebooks on a Graphics Calculator! The New HP 38G and Aplets"

Richard Delaware, University of Missouri - Kansas City, Kansas City, MO

The new HP 38G has brought the interactive notebook/electronic lessons concept, which HP calls Aplets, to an inexpensive graphics calculator for high school and college; school cost is <$70. The HP 38G includes and improves upon all the best features of previous graphics calculators. This is NOT your father's HP! Some particularly nice features are:

- Standard algebraic notation (NO Reverse Polish here!)
- Easy fill-in-the-blank menus
- The only attached hard cover on the market
- Infra-red link between units (no cords!)
- Uses only 3 AAA batteries
- Highest LCD pixel resolution, and split screen
- 3 keys for Graphical (PLOT), Symbolic (SYMB), and Numerical (NUM) viewpoints
- A notepad for text and sketches
- Symbolic derivatives and integrals
- Dozens of free Aplets on disk.

In this workshop, we'll review the basic operations of the HP 38G, emphasizing its innovative aspects. You will have time to personally explore your choice of several Aplets. All you need is some basic experience with any other graphics calculator.
NOTE: Thirty HP 38G calculators will be available for this workshop.
Presider: Donna Bullock, Central High School, KCMSD, Kansas City, MO

9C. Room 3618

WORKSHOP: WWW + Mathematics: It All "Adds Up!"

Linda Herndon, OSB, Benedictine College, Atchison, KS

During this hands-on, interactive workshop, participants will see demonstrated the use of gophers, telnet, ftp, email, and web browsers as ways to access resources in mathematics useful for a variety of courses. Brief mention will also be given to ethical considerations when using the World Wide Web. There will be time for participants to experiment with these WWW tools. Some time will also be allowed for discussion and sharing. Some experience with *SketchPad* would be helpful.
Presider: Kay Weiss, Kansas City Kansas Community College, Kansas City, KS

9D. Room 3620

WORKSHOP: Geometry and Technology

David Ewing, Central Missouri State University, Warrensburg, MO

Actively learn to use *Geometer's SketchPad* to Create lessons that have your students explore, investigate, apply, and communicate "new" and "old" theorems and problems in geometry. In this hands-on workshop,

you will develop several lessons and learn several advanced skills (like motion and sound). Some experience with SketchPad would be helpful.
Presider: Anita Salem, Rockhurst College, Kansas City, MO

Room 3619 The Technology Display Area is OPEN from 1:00 p.m. - 2:00 p.m.

1996 Mathematics Technology EXPO Planning Committee

Libby Holmgren, 1995 and 1996 Chair
Johnson County Community College, Overland Park, KS

Carl Anderson
Johnson County Community College, Overland Park, KS

Andy Bennett
Kansas State University, Manhattan, KS

Mike Brown
Longview Community College (MCC),
Lee's Summit, MO

Donna Bullock
Central High School, KCMSD, Kansas City, MO

Richard Delaware, 1993 and 1994 Chair
University of Missouri - Kansas City, Kansas City, MO

Ken Eichman
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