12th Annual Kansas City Regional
MATHEMATICS
TECHNOLOGY
EXPO

at the Richardson Science Center, Rockhurst University, Kansas City, MO
Friday and Saturday, October 4 and 5, 2002

Schedule of Events and Abstracts

We thank Rockhurst University for the generous hospitality in providing the lecture hall, classrooms, and exhibitor area, as well as computers, Internet connections and audiovisual equipment. We thank the Rockhurst students and faculty, who have given up their usual classrooms so that the EXPO could take place. Our thanks also go to the following individuals from Rockhurst for their technical support of the EXPO: Matt Heinrich, Director of Computing Services; Bryan Schrivener, Systems Integrator; and Michael Marshall, Support Technician.

We thank the Kansas City Professional Development Council (KCPDC) for sponsoring many EXPO participants, and we thank Johnson County Community College for funding paper and printing for all EXPO mailings as well as the program booklet and other materials in the EXPO packets.

Registration in the lobby of Richardson Science Center:
Friday, 8:00 a.m. – 1:45 p.m., and Saturday, 8:00 a.m. – 1:00 p.m.

Complimentary continental breakfast:
Thomson Learning Brooks/Cole and KAMATYC/AMATYC are sponsoring continental breakfasts both Friday and Saturday mornings in the registration area.

Lunches:
Friday buffet and Saturday box lunches are both $6.50 apiece. Lunches were ordered with pre-registration, but there may be some available for purchase at the EXPO registration table.

Technology Display Area located in the Conference Lounge, Room 206
Friday, 10:15 a.m. – 3:30 p.m.; Saturday, 8:00 a.m. – 2:45 p.m.
Hands-on Displays of Mathematics Software:
Derive5, Scientific Notebook, Geometer's SketchPad, Mathematica, Minitab, MS Excel TI Interactive!, plus Internet access.

Textbook, Hardware, and Software Exhibitors:
Friday, 8:00 – 2:45 p.m.; Saturday, 8:00 a.m. – 1:00 p.m. (Not all exhibitors will be present on Saturday.)
Academic Systems, Addison Wesley, Key College Publishing, MAA books, McGraw Hill, Prentice Hall, Quant Systems, Thinkwell, Texas Instruments, Wiley.

FRIDAY, October 4, 2002

Welcome and Introductions

8:45 a.m. in **Room 115**
Marian VanVleet, 2002 EXPO Group Chair, Saint Mary College, Leavenworth, KS
Dr. William Haefele, Vice President for Academic Affairs, Rockhurst University, Kansas City, MO

SESSION 1 – Keynote Address

Friday, 8:50 a.m. – 10:00 a.m.
Room 115

How Not to Teach Mathematics
Edward Burger
www.williams.edu/Mathematics/eburger
Williams College, Williamstown, MA

Dr. Burger will describe some recent adventures with technology in College Algebra, Pre-calculus, and Calculus courses. The main focus will be on how and where students learn in our classes. This address will primarily emphasize practical, specific teaching methods, with just a light sprinkling of general pedagogical philosophy. Wild departures from conventional wisdom will be discussed, and high-tech demonstrations will be offered.

Door prizes will be awarded directly following Ed Burger's address.

SESSION 2

Friday, 10:15 a.m. – 11:00 a.m.

2A. ***Using Microsoft Excel to Graph in 3-D***
Room 203 **Carl Anderson & Ron Palcic, Johnson County Comm. College, Overland Park, KS**
It is not well known that *Excel* has the capability of graphing in 3-D. The presenters will demonstrate this capability along with some tricks, which enable the user to animate families of functions and to show both a 3-D graph and a contour map at the same time. The course targeted is Calculus III, but the processes could be adapted to any level by using single variable functions. Little or no knowledge of *Excel* is assumed.
Presider: Linda Hand, Missouri Southern State College, Joplin, MO

2B. ***Are Your Students Calculator-Ready for College Algebra?***
Room 205 **Joe Meditz & Margret Hathaway, Kansas City Kansas Comm. College, Kansas City, KS**
After talking with colleagues the last couple of years, it has become apparent that many teachers are also feeling the pressure of trying to squeeze in training on the graphing calculator along with covering all of the required lessons in the curriculum. This was the underlying premise for the creation of our new TI-83 mini-course, "Graph Tech 107." Topics of the course include an introduction of the keyboard and related drop-down menus. Attention is devoted to graphing linear, quadratic, and cubic functions, along with the study of the regression of each, as well as investigating the Stat List function of the calculator.

All participants at the EXPO presentation will receive the 45 page course workbook, including all 13 student lessons, a copy of the 10 take home assignments, the two in-class quizzes, as well as all answer keys and a complete course syllabus with objectives, goals, and measurable outcomes.
Presider: John Soptick, Kansas City Kansas Community College, Kansas City, KS

2C. Room 302 ***A Practical Connection Between Undergraduate and Secondary School Geometry: Projects for Teachers, Using Geometer's SketchPad and Cinderella***
Timothy D. Comar, Benedictine University, Lisle, IL
The presenter will describe a project for which students create interactive, guided geometry exercises using the dynamic geometry software package *Cinderella*. He will present examples of student work and discuss the practical connection between undergraduate level geometry and the geometric content taught in secondary schools. He will not only discuss the logistics of the particular project designed for future secondary school teachers but also will address ideas for projects or demonstrations for the secondary school geometry classroom. He will also discuss a modified version of this project for future elementary school teachers using *The Geometer's Sketchpad.*
Presider: Steven Wilson, Johnson County Community College, Overland Park, KS

2D. Room 306 ***Data-Mining an On-Line Homework System***
Andy Bennett, Kansas State University, Manhattan, KS www.math.ksu.edu/~bennett
This talk will discuss how students interact with an on-line homework system and what information can be gained about student learning from mining the data gathered by the system.
Presider: Patrick Cassens, Missouri Southern State College, Joplin, MO

SESSION 3 *Exhibitors and Technology Display Area*
Friday, 11:00 a.m. – 11:45 a.m.

Lobby and Room 206 This time is provided especially so that EXPO participants will have a chance to visit both the Exhibitors in the lobby of the Richardson Science Center and the Technology Display Area (TDA), located in the EXPO Conference Lounge, Room 206. In the TDA, participants can have hands-on experience with a variety of software packages that are being used in EXPO presentations. Extra handouts from EXPO sessions will be made available in the Conference Lounge. The Exhibitors Area and the Conference Lounge will also be open at other times during the EXPO.

SESSION 4
Friday, 11:45 a.m. – 12:30 p.m.

4A. Room 203 ***Discussion: Pros and Cons of On-Line Teaching and Learning***
Moderators: David Ewing, Central Missouri State University, Warrensburg, MO
Nic LaHue, Penn Valley Community College, Kansas City, MO
Learning math 'Online' is one of the fastest growing methods for teaching math in college as well as high school. Is this an administrative 'pipe-dream' or is this a real possibility? Come join our discussion of the Pros and Cons as well as the possibilities and improbabilities of this method.

4B. ***Discussion: Finding the Time to Learn the Technology***

Room 205 **Moderators: Richard Gill, Blue Valley High School, Stilwell, KS,**
Libby Holmgren, Johnson County Community College, Overland Park, KS
The calculators and computers have arrived. The software has been installed. The school year has begun. When is a person supposed to find time to learn how to use this wonderful stuff? Positive solutions to this problem are being sought. For some, attending workshops and clinics has been beneficial. Others have created change within their institutions to give themselves time. Come share your successes and listen for ideas on how you might improve your "technology learning time."

4C. ***Discussion: Can You Find the Technology Funding You Need?***

Room 302 **Moderators: JoeYanik, Emporia State University, Emporia, KS**
Tamatha Leuschen, Pembroke Hill Upper School, Kansas City, MO
Keeping up with advances in technology can be expensive. This discussion group will explore strategies for obtaining funding for technology, including the pursuit of regional and national grants, donor solicitations, and institutional support.
Note: A workshop on grant writing (session 5A) follows lunch.

4D. ***Talk: Learning Mathematics Through Web-Based Physics Experiments***

Room 306 **Chuck Pheatt & Jorge Ballester, Emporia State University, Emporia, KS**
http://dropball.cs.emporia.edu
The authors have implemented a hands-on web-based implementation of a physics experiment. Students are able to conduct a real experiment to gain familiarity with important mathematics concepts as well as computer-based data acquisition and analysis. Students will be able to generate and analyze the force versus time data using a web browser or download the data for analysis to their local computer. Mathematical concepts explored using this technology include topics in Calculus II and Differential Equations.
Presider: Cathleen O'Neil, Johnson County Community College, Overland Park, KS

LUNCH

Friday, 12:30 p.m. – 1:45 p.m. in Massman Hall

SESSION 5

Friday, Sessions begin at 1:45 p.m. 5A lasts until 3:30 p.m. 5B, 5C, 5D, and 5E last until 2:30 p.m.

5A. ***WORKSHOP: Keys to Successful Grant Writing*** **(Workshop is 1:45 p.m. – 3:30 p.m.)**

Room 125 **Joe Yanik, Emporia State University, Emporia, KS**
www.emporia.edu/math-cs/yanikjoe/
Grants are one source of technology funding. This two-part workshop will cover the process of writing a grant proposal. It will include tips for getting an idea for a grant proposal, laying the foundation for the proposal, and writing the proposal. One feature of the workshop will be a mock panel review in which an actual proposal will be read and reviewed by the workshop participants. The workshop will primarily focus on proposals to the Department of Undergraduate Education of the National Science Foundation, but many of the keys presented will be applicable to proposals for other programs.
Presider: Linda Hand, Missouri Southern State College, Joplin, MO

5B. ***A Visual, Dynamical Approach to the Quadratic Surfaces Using Maple Animation***

Room 203 **Peter Jarvis & Lynne Melder, Georgia College & State University, Milledgeville, GA**

This talk will begin with the three variable quadratic equations, which give rise to the quadratic surfaces typically covered in Calculus III. Often, the usual presentation of these surfaces is 'static' (i.e., each is presented individually, independent of the others), and the surfaces presented are only those arising from equations in standard form: $X^2 \pm Y^2 \pm Z^2 = 1$. This talk will show, using *Maple*'s animation graphics, how these surfaces can be smoothly changed from one to another, starting with the ellipsoid and varying the coefficients in the more general equation $aX^2 + bY^2 + cZ^2 = d$.

Presider: Cathleen O'Neil, Johnson County Community College, Overland Park, KS

5C. ***Solving College Algebra Problems Using Microsoft Excel***

Room 205 **Larry Long, DeVry University, Kansas City, MO www.llong.devry.edu**

This presentation will show how to use Linear Regression, Financial Analysis, and Linear Programming tools to set-up and solve College Algebra problems in *Excel*. Each participant will receive a set of written problems, descriptions of how to prepare the computer inputs, descriptions of how to execute Microsoft programs and to obtain problem solutions.

Presider: Mark Whisler, Cloud County Community College, Concordia, KS

5D. ***Three Courses Designed to Prepare Secondary Teachers For Using Technology***

Room 302 ***In the Classroom***

Tim Flood, Pittsburg State University, Pittsburg, KS

Several years ago Pittsburg State University began offering three, 1-hour courses that are required for math teachers seeking secondary certification and recommended for those seeking middle school certification. One course is on the use of manipulatives including Geoboards, Algebra Tiles, Algeblocks, and Miras and is geared to middle school and early high school. Another course covers topics on graphing calculators appropriate for middle school and high school and provides hands-on experience using the TI-82, TI-92, and the TI-CBL. The third course is on the use of computer software including *Excel*, *Geometer's Sketchpad*, and *Maple*. It is primarily for high school teachers but can be modified for middle school teachers. A variety of the activities typically covered in each course and how the topics are related to the Kansas licensure requirements will be presented, along with a brief history of the development of these courses.

Presider: Brenda Reed, Lincoln University, Jefferson City, MO

5E. ***Observing the Onset of Chaos of Some Dynamical Systems with Mathematica***

Room 306 **Andreas Somadi, Kirkwood Community College - Iowa City Campus, Iowa City, IA www.soemadi.com**

A collection of non-linear differential equations describes a dynamical system, and when small changes in initial conditions lead to exponentially large changes in the final state of the system, we say that chaos occurs. A device invented by Henri Poincare, now called a Poincare section, provides a snapshot of the state of the system at a given time. In this talk, a series of such snapshots created using *Mathematica* are shown in sequence forming a "movie" of several dynamical systems in order to study how the onset of chaotic regions is related to the solutions of the corresponding differential equations. This talk is appropriate for anyone teaching Calculus or Ordinary Differential Equations.

Presider: Paula Shorter, Rockhurst University, Kansas City, MO

SESSION 6

Friday, 2:45 p.m. – 3:30 p.m.

6A. ***Teaching Abstract Algebra with GAP (Groups, Algorithms, & Programming)***

Room 203 **Kevin Anderson, Missouri Western State College, St. Joseph, MO**
www.mwsc.edu/~andersk/gap.htm

GAP (Groups, Algorithms, and Programming) is a system for computational discrete algebra with particular emphasis on computational group theory, and the best part is that it is freeware! The presenter will demonstrate the use of *GAP* and show how it can be used for investigation and calculation in an abstract algebra course.

Presider: Kay Weiss, University of Oklahoma, Norman, OK

6B. ***Calculators Cannot Solve All Problems, or All Problems Correctly***

Room 205 **Vincent Lempke, Central Community College, Columbus, NE**

Students believe that calculators are magic black boxes that should be able to solve all problems - and if all the keys are punched correctly, the answers they receive should be correct. This talk will focus on problems the TI-89 cannot solve and some problems it does incorrectly. It will also highlight a few problems from the TI-92 and TI-85.

Presider: Mark Whisler, Cloud County Community College, Concordia, KS

6C. ***Excel Tricks to Create Math of Finance Demonstrations – A Deeper Look at Last Year's Broad Presentation***

Room 302 **Merrill Goldberg, Rockhurst University, Kansas City, MO**

Mathematics of Finance consists of using exponential functions to consider the ***time value of money.*** The ***Lump Sum*** formula allows comparison of the value of an item at various times. An ***Annuity*** is a *sequence of equal periodic payments* made over time. Examples include saving $100 per month toward a future goal, or making house payments of $1,000 per month to pay back a home loan (mortgage). In addition to handouts presenting the topics, *Excel* spreadsheets illustrate key concepts, while allowing the actual values used to be changed according to the demands of audience. Color and Conditional Formatting techniques available in *Excel* enhance the readability and usefulness of the spreadsheets. Form letter writing techniques in *Word* are combined with an *Excel* Worksheet supplying the input data in order to produce individualized quizzes with answer keys.

Presider: Chuck Pheatt, Emporia State University, Emporia, KS

6D. ***E-Pedagogy As an Alternative Way***

Room 306 **Satya Mandal, University of Kansas, Lawrence, KS** **www.math.ukans.edu/~mandal/**

Consider the proposition that in this age of e-commerce, the importance of class attendance has diminished, and high-quality instruction can be delivered and received successfully through a combination of high-quality online support and some email or in class instruction. Such a model is tested by providing detailed lecture notes with multimedia illustrations, multimedia problem solutions and with the help of an online homework system. *Flash-5* (a Macromedia software) was used to develop multimedia content and an SQL- based homework system was used. A summary of student data that was collected and the investigator's experiences with the Elementary Statistics Course (Math 365) and the Topics of Mathematics (Math 105) course will be reported. Multimedia illustrations and the homework system will be demonstrated. We

derive inspiration from e-commerce. E-commerce has become an essential arm in the corporate sector. We consider whether e-pedagogy could develop as an essential arm of college education.
Presider: Paula Shorter, Rockhurst University, Kansas City, MO

POST-SESSIONS for KAMATYC and MOMATYC

Friday, 3:30 p.m.
Room 306 KAMATYC – informal meeting
Room 302 MOMATYC – informal meeting
(Interested KAMATYC and MOMATYC participants will go to supper together after the meetings.)

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SATURDAY, October 5, 2002

SESSION 7

Saturday, 9:00 a.m. – 9:45 a.m.

7A. ***Teaching Statistics Using Microsoft Excel – An Alternative to Handheld***
Room 125 ***Technology***
Uwe Conrad, Cowley County Community College – Wichita Campus, Wichita, KS
Many of our new calculators come equipped with excellent statistical applications; however, use of these features in the "real world" is rather limited. Microsoft *Excel*, incorporating the DDXL, add-ins can be an alternative tool in the statistics class. As an additional benefit to its ready availability, data obtained by these methods can easily be incorporated into *Word* documents and *Power Point* presentations. The presentation will include the following: Frequency Tables; Graphing Data; Measures of Center, Variation, and Position; Mean, Variance and Standard Deviation of the Binomial and Normal Distribution; as well as Hypothesis Testing.
Presider: Jacque Maxwell, Wellington – Napoleon High School, Wellington, MO

7B. ~~***Animations: A Teaching Tool for Multivariable Calculus Using Mathematica***~~
Room 203 ~~***and FLASH***~~
~~**Jose Flores, University of South Dakota, Vermillion, SD**~~

7C. ***Bio-Mathematics – Curriculum, Models, and Technology***
Room 205 **Mike Martin, Johnson County Community College, Overland Park, KS**
Mathematics plays a very important if under-appreciated role in biology and the biotechnology industry. Although a great deal of biology can be done without any mathematics, the powerful new technologies that are transforming fields of biology are increasingly quantitative and mathematical at their core. Participants of this session will learn about curriculum reform of and technologies associated with mathematical biology at the early undergraduate level. Modeling techniques associated with calculus, discrete mathematics, and statistics will be featured. Handouts will be made available. These

handouts will summarize aspects of the presentation and provide additional pointers to other resources.
Presider: Jorge Ballester, Emporia State University, Emporia, KS

7D. ***Free & Low-Cost Course Management Software That Everyone Can Use***
Room 302 **Mariah Birgen, Wartburg College, Waverly, IA** www.wartburg.edu/mcsp/birgen
At Wartburg College, *Manhattan* isn't an island off the Jersey shore. It is a free, open source, virtual classroom that has won the support of the Math, Physics, Computer Science Department. We use this online course management system for many math, computer science, and general education courses. I will present a variety of free or low-cost course management software, including *Manhattan*, that you can use to reduce paperwork and save course organization time
Presider: Vincent Lempke, Central Community College, Columbus, NE

7E. ***What Life Lessons Can We Offer Our Non-Science Students?***
Room 306 **Ed Burger, Williams College, Williamstown, MA** www.williams.edu/Mathematics/eburger
What is the value of mathematics to the humanities population? Where is our focus? What are our goals? What will students remember from their math classes after 15 years? Here we will highlight the lessons mathematics offers that can make our courses one of the most important components of our students' education. We will look at a new vision for touching the lives of those students who are not math fans.
Presider: Rick Silvey, Saint Mary College, Leavenworth, KS

SESSION 8

Saturday, 10:00 a.m. – 10:45 a.m.

8A. ***Teaching Algebra and Geometry Via the Internet***
Room 125 **David Ewing, Central Missouri State University, Warrensburg, MO**
Come watch several algebra and geometry lessons taught/learned via the internet. These lessons will include using passive bulletin board (*Blackboard*), inter-active (*Java*) lessons, and real-time
(*Netmeeting*). Developing a website to help you teach math will also be briefly discussed.
Presider: Jacque Maxwell, Wellington-Napoleon High School, Wellington, MO

8B. ***Visualization of Mobius Transformations In Two and Three Dimensions Using Derive***
Room 203 **Timothy Comar, Benedictine University, Lisle, IL**
This presentation will show computer algebra explorations that are designed to help students develop a visual understanding of the beautiful geometry of Mobius transformations in the complex plane and in three-dimensional hyperbolic space. Techniques employed depend on basic analytic geometry and the graphing capabilities of a computer algebra system. Participants will receive handouts and *Derive* files. Participants will work through the explorations with assistance from the speaker. Participants not familiar with hyperbolic geometry or topology are strongly encouraged to attend, as appropriate mathematical background will be discussed. Expected level of expertise of the audience is high school geometry.
Presider: Chuck Pheatt, Emporia State University, Emporia, KS

8C. ***Par, Pol, and Seq: What Do They Do? Moving Beyond Func(tions) on the TI-83***

Room 205 **Richard Gill, Blue Valley High School, Stilwell, KS**

Most math teachers know how to use the Func(tion) mode on the TI-83 Graphing calculator, but what about those other modes? When, why and where would one use Par(ametric), Pol(ar), and Seq(uential) modes in the algebra or geometry classroom? This talk will give brief overviews of each mode with examples, explanations, appropriate windows and hands-on activities. Appropriate audience for this presentation: high school and community college teachers of elementary algebra to precalculus.

Presider: Vincent Lempke, Central Community College, Columbus, NE

8D. ***Using E-mail to Get Students to Actually Read the Textbook***

Room 302 **Mary Rack, Johnson County Community College, Overland Park, KS**

Functions Modeling Change, a Harvard Consortium text, is well written and extremely readable. The approach utilizes the preferred "guide on the side" model of teaching to promote student responsibility for learning. All of this, however, is pie-in-the-sky unless we can get students to read and think about what they have read. Class time can then be more active, with the instructor asking and answering questions and filling in gaps, and the students asking and answering questions and working together. One way to encourage reading the text is the sending of "reading questions" to students, with their responses due back at least 30 minutes before the next class. By skimming through these E-mails, an instructor can determine which topics are most in need of attention during the up-coming class. An accounting of this experience in a five-hour pre-calculus class will be presented, along with an overview of the text and the course. Handouts will include sample questions and responses.

Presider: Kay Weiss, University of Oklahoma, Norman, OK

8E. ***Using PHP (Hypertext Preprocessor) for Interactive Web Pages***

Room 306 **Andy Bennett, Kansas State University, Manhattan, KS**

The presenter will show an overview of *PHP* as one of the tools useful to people who want to add interactivity to a web site beyond a set of hyperlinks. While *PHP* is a full programming language, it is designed to make it easier to add basic interactivity to a web page than writing Java applets or CGI programs. In particular, *PHP* makes it very easy to handle data submitted from a standard HTML web form.

Presider: Kent Craghead, Dodge City Community College, Dodge City, KS

SESSION 9 and SESSION 10 → → → → → → →

SESSION 9 – Invited Speaker

Saturday, 11:00 a.m. – 11:45 a.m.

Room 115
Presiding: Marian VanVleet, 2002 EXPO Group Chair, Saint Mary College, Leavenworth, KS

On-Line Mastery Learning in Math and the Sciences

John Orr

www.math.unl.edu/~jorr/
University of Nebraska, Lincoln, NE

Faculty today face increasing demands to do more with less. How do we provide individualized learning experiences in the context of large classes? How do we promote active learning while still ensuring our students grasp "the basics"? How do we meet the needs of a more diverse student body, with varied learning styles and schedules? Technology promises solutions to these problems, but often comes at the cost of mastering complex new skills, leading to the further question: How do we implement technological tools in the classroom in a way faculty will want to use? The talk will present recent case studies and technology strategies from the University of Nebraska - strategies that promote mastery learning using web-based homework and tests.

Door prizes will be awarded directly following John Orr's address.

LUNCH

Saturday, 11:45 a.m. – 1:00 p.m. in Massman Hall

SESSION 10

Saturday, 1:00 p.m. – 1:45 p.m.

10A. ***EDU (Enterprise Diploma), a Web-Based Assessment Tool***

Room 115 **John Orr, University of Nebraska, Lincoln, NE** www.math.unl.edu/~jorr/
The talk will showcase advanced features of the *EDU* assessment software. The emphasis will be on how to use the software to do homework, quizzing and exam assignments in math. There will be a detailed how-to on setting up a first assignment. In addition, there will be a demonstration of tools for creating sophisticated math questions, including math notation, randomly-chosen parameters, and advanced grading capabilities.
Presider: Patrick Cassens, Missouri Southern State College, Joplin, MO

10B. ***A Multimedia Introduction to 3-D Spatial Visualization***

Room 125 **Beverly Baartmans, Michigan Technological University, Houghton, MI**
Nine multi-media modules will be demonstrated for enabling students to develop their 3-D spatial skills. The modules address the following topics: (1) isometric sketches, (2) orthographic projection, (3) flat patterns folding to 3-D objects, (4) rotation about one axis, (5) rotation about two or more axes, reflections and symmetry, (7) cross sections of solids, (8) surfaces and solids of revolution, and (9) combining solids. These stand-alone modules

and a student workbook are the culmination of five years of NSF funded work. Assessment data for the multimedia modules and students' gain scores will also be presented.
Presider: Kent Craghead, Dodge City Community College, Dodge City, KS

10C. ***Visualizing PDEs Using Mathematica***

Room 203 **Timothy Miller, Missouri Western State College, St. Joseph, MO**

Mathematica can be used as a tool to perform calculations, but it can also be used to visualize mathematical concepts. The presenter will demonstrate the use of *Mathematica* to visualize the concepts in an introductory course in partial differential equations. Some of the topics demonstrated include the convergence of Fourier series, vibrating strings and membranes, and traveling waves.
Presider: Joe Yanik, Emporia State University, Emporia, KS

10D. ***Link & Load With the TI-83 Plus***

Room 205 **Tamatha Leuschen, Pembroke Hill Upper School, Kansas City, MO,**
Richard Gill, Blue Valley High School, Stilwell, KS

Why do the graphing calculators have memory? This talk will introduce some of the applications that are available on the TI web site. This session will focus on demonstrating the download of free applications as well as calculator-to-calculator linking. A classroom set of TI-83 Plus Silver calculators will be available, so that participants can actually try the downloads. Note: At the conclusion of this session, there will be a drawing to give away three PC Graph Link packages to Session 10D participants.
Presider: Jim Carlson, Neosho County Community College, Chanute, KS

10E. ***Projects in Polar Curves With Maple***

Room 302 **Kevin Charlwood, Washburn University, Topeka, KS**

We shall examine several projects in polar curves, including a "Butterfly Curve" and curves of the form

$r = \cos(\frac{p}{q}\theta)$, where p and q are integers.

The emphasis is on student experimentation, and on students giving explanations as to why certain given polar curves behave the way they do graphically. Students use Maple as a tool to help them conceptualize what is happening graphically through suitable changes to the defining polar formulas.
Presider: Steven Wilson, Johnson County Community College, Overland Park, KS

www.kcmetro.cc.mo.us/~mathtechexpo/expo.html

The 2002 EXPO Group:

- Marian VanVleet (1999 - 2002 Chair), Saint Mary College, Leavenworth, KS, vanvltm@hub.smcks.edu
- Carl Anderson, Johnson County Community College, Overland Park, KS, canders@jccc.net
- Andy Bennett, Kansas State University, Manhattan, KS, bennett@math.ksu.edu
- Keith Brandt, Rockhurst University, Kansas City, MO, keith.brandt@rockhurst.edu
- Richard Delaware (1993 & 1994 Chair), University of Missouri – Kansas City, Kansas City, MO, RDelaware3141@cs.com
- Ken Eichman (1997 & 1998 Chair), Longview Community College, Lee's Summit, MO, eichman@kcmetro.cc.mo.us
- David Ewing, Central Missouri State University, Warrensburg, MO, ewing@cmsu1.cmsu.edu
- Richard Gill, Blue Valley High School, Stilwell, KS, rgill@bv229.k12.ks.us
- Libby Holmgren (1995 & 1996 Chair), Johnson County Community College, Overland Park, KS, lholmgre@jccc.net
- John Koelzer (Site Coordinator & 2002 Financial Secretary), Rockhurst University, Kansas City, MO, John.Koelzer@rockhurst.edu
- Nic LaHue, Penn Valley Community College, Kansas City, MO, Lahue@kcmetro.cc.mo.us
- Tamatha Leuschen (2002 Recording Secretary), Pembroke Hill Upper School, Kansas City, MO, tleuschen@pembrokehill.org
- Joe Yanik, Emporia State University, Emporia, KS, yanikjoe@emporia.edu

Events/Activities in Kansas City:

www.kansascity.com