M.A.A. & FTYCMA
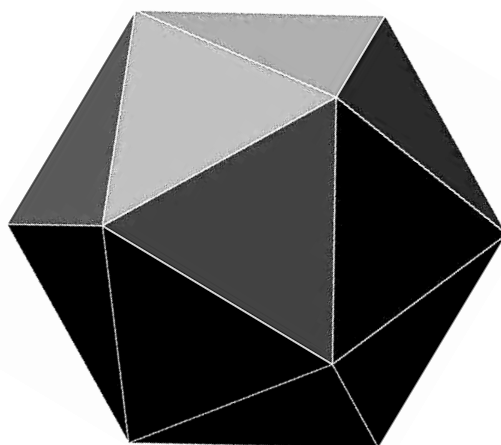
2010 Joint Annual Meetings

PROGRAM AND ABSTRACTS

Santa Fe College

February 19 -20, 2010

Florida Section of the Mathematical Association of America

2009 – 2010

Governor	Scott Hochwald, UNF
President	Pam Crawford, Jacksonville
Past President	Joel Berman, Valencia
Vice-President for Programs	Monika Vo, Saint Leo
Vice-President for Site Selection	Daniela Genova, UNF
Secretary-Treasurer	John Waters, SCF
Newsletter Editor	David Kerr, Eckerd
Coordinator of Student Activities	Julie Francavilla, SCF
	Christina Dwyer, SCF
	Janet Samuels, SCF
Webmaster	Altay Özgener, SCF
President-elect	Charles Lindsey, Florida Gulf Coast
VP for Programs-elect	Daniela Genova, UNF
VP for Site Selection-elect	Jacci White, Saint Leo

Florida Two-Year College Mathematics Association

2009-2010

President	Don Ransford, Edison
Past President	Byron Dyce, Santa Fe
Vice-President for Programs	Bill Hemme, SPC
Secretary	Janet Campbell, Palm Beach
Treasurer	Michael Jamieson, Central Florida
Newsletter Editor	Rick Pal, Valencia
Membership Chair	Ryan Kasha, Valencia
Webmaster	Altay Özgener, SCF
President-elect	Rick Paul, Valencia

PROGRAM

Friday, February 19, 2010

Committee Meetings and Workshops

FL – MAA

9:30 - 11:00	Executive Committee Meeting	Room P-266

FTYCMA

10:00 – 10:50	FTYCMA Officer's Meeting	Room S-029
11:00 – 12:30	FTYCMA Annual Business Meeting	Room S-029
12:00 – 1:30	FTYCMA Lunch sponsored by Cengage Learning	Room S-029

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Registration

11:00 –	Registration & Publishers	Room P-260

Sign in and browse the displays from several publishing representatives.

WELCOME

1:45 – 2:00	**Welcoming Remarks**	Room WA104

Edward T. Bonahue, Ph.D.
Interim Provost and Vice President for Academic Affairs of Santa Fe College and
Steve Grosteffon Chair, Mathematics of Santa Fe College
Don Ransford, President, FTYCMA
Monika Vo, Vice-President for Programs, FL-MAA

Friday, February 19, 2010

2:00 – 2:50   **Plenary Session**   **Room WA104**

David Bressoud – President, Mathematical Association of America

Issues of the Transition to College Mathematics

3:00 – 3:45   **Contributed Papers Session I**

Jackie Copeland - State College of Florida, Manatee-Sarasota   Room P-160

Orange Grove and Orange Grove Open Text Books: The State of Florida Repository (your source for FREE materials and textbooks for your course)

Don Ransford - Edison State College   Room P-163

The Road Ahead for Undergraduate Mathematics: Part II

Rebekah Downes - University of North Florida   Room P-161

A Simple Mathematical Model of the Mammalian Auditory Pathway

Daniel Dreibelbis – University of North Florida   Room P-165

Curves and Surfaces from 3-D Matrices

James Condor - State College of Florida   Room P-236

Using Trigonometry to Gain a Higher Level of Consciousness

Helen P. Gerretson - University of South Florida   Room P-263

Using Literacy Strategies in the College Mathematics Classroom

Timothy Holifield - Stetson University

Nonlinear Interactions in a Fiber-Optic Cable

Dennis C. Runde - State College of Florida   Room P-265

How Many Points is "Let x = Dennis's speed" Worth? Or Grading Problem Solving Using a Rubric

4:00 – 4:45   **Contributed Papers Session II**

Jackie Copeland - State College of Florida, Manatee-Sarasota   Room P-160

Educating Our Students for Their Future: Using Technology in College Math Curriculum

Wendy Perry - University of Tampa   Room P-163

Using Adobe Flash Animations to Teach College Algebra

Danielle Wilson – Stetson University   Room P-161

Lie Symmetries of Differential Equations

Stephen Rowe - Wilkes Honors College, Florida Atlantic University

On Property P_1 and Spaces of Operators

Shanzhen Gao - Florida Atlantic University   Room P-165

Patterns in Walks and Paths

Amy Mihnea - Florida Atlantic University

Patterns for derangements with a single cycle

William Dentinger – Saint Leo University   Room P-263

How using MyMathLab® in an introductory Statistics class effect the final grades?

Louis Concillio – Saint Leo University

Finding integer partitions using different programs

Joy D'Andrea – University of South Florida   Room P-265

Describing Some Polyhedra and their Symmetry group

Katherine Vecchi – Saint Leo University

Parachuting Behavior of Dendrobaties pumilio when Dropped from Primary Forest Canopy of Isla Colon, Panama

| 3:00 – 6:15 | **Student Events** | Room P-262 |

3:00- 4:00   Student Integration Contest
     Come test your integration abilities!

4:00 – 5:00   Student Math Puzzle Contest
     Attempt to solve our Sudoku and Ken-Ken puzzles.

Please note that we are using this room as our Student Hospitality room.
Feel free to come and join other students in here!

| 4:00 – 6:15 | **Workshops** | Room P-236 |

4:00 – 5:00   **Nancy Johnson & Ena Salter** – State College of Florida-Manatee-Sarasota

Introduction to LaTeX
Basic of the typesetting program LaTeX will be introduced. We will discuss:
1. *File structure*
2. *Formulas*
3. *Images*

5:15 – 6:15   **Joni Pirnot & C. Altay Özgener** – State College of Florida-Manatee-Sarasota

More on LaTeX
We will discuss:
1. *Installing a working copy of LaTeX, in our case, Miktex*
2. *Installing a LaTeX Editor (Texmaker or TeXnicCenter)*
3. *Various classes and packages of LaTeX*
4. *Book, Article classes*
5. *Beamer package*
6. *PSTricks*
7. *TIKZ*

4:45 – 5:30   **Conference Break**

Please visit the textbook publishers in room P-260.

| 4:45 – 5:30 | **Governor's Session** | Room P-265 |

Scott Hochwald, University of Florida

What can the MAA do for you and what can you do for the MAA?

5:30 – 6:15   **Contributed Papers Session III**

Ken Mulzet - Florida State College at Jacksonville   Room P-160

An Eigenvalue Approach to Rotation of Axes in Two Dimensions

Scott Hochwald – University of North Florida   Room P-161

Too much Pi

Julie Miller - Daytona State College   Room P-163

"The Grapes of Math," Investigating Mathematics in Literature

Justin Owen - Wilkes Honors College, Florida Atlantic University   Room P-164

Boundary Value Problems on the Sierpinski Gasket

Isaac DeFrain - Wilkes Honors College, Florida Atlantic University

Classifying Subspaces of L_p with Alspach Norm

Steve Blumsack –Florida State University   Room P-263

Finding the Best Point: Integrating Algebra, Geometry and Statistics for Grades 7-16

Heather Edwards - Seminole State College   Room P-265

SCC Advance: Strengthening the Foundation of STEM Education for Seminole Community College Students

6:30 – 8:30   **Conference Banquet and Awards Ceremony**   Room R-01

Saturday, February 20, 2010

9:00 – 9:50   **Plenary Session**   **Room WA104**

Natasha Jonoska - University of South Florida

DNA rearrangements through spacial graphs

10:00 – 10:45   **Contributed Papers Session IV**

Patrick Bibby - University of Miami   Room P-160

An Intermediate Value Property for Directional Derivatives

Denis Bell- University of North Florida   Room P-163

Associative Binary Operations and the Pythagorean Law

Robert Lang -Wilkes Honors College, Florida Atlantic University   Room P-165

The Minimum Rank Problem for Chordal Graphs

Sarah Crimi - Wilkes Honors College, Florida Atlantic University

Ultrasonic Transducers and Finite Element Modeling

Megan Beddow – Florida Southern University   Room P- 236

Collectionwise Weak Continuity Duals

Chuck Lindsey - Florida Gulf Coast University   Room P-263

Tools for Drawing Conic Sections

Steve Boast - Lake Sumter Community College   Room P-265
Effective use of the tablet pc in the mathematics classroom

11:00 – 11:45   Contributed Papers Session V

John Squires and Karen Wyrick - State Community College,   Room P-160
Cleveland, Tennessee

   Do the Math! Increasing Student Engagement and Success through Course Redesign

Salam Khan – Florida State University   Room P-163

   Mathematical Model of Conflict and Cooperation

Mike Keller - St. Johns River Community College   Room P-165

   History of Cubic Equations

Evelyn Lozano – Florida Southern University   Room P- 236

   Semi-separation in topological spaces

Leonard J. Lipkin - University of North Florida   Room P-263

   Let's Read the News with our Students

Ben Fusaro- FSU   Room P-265

   Mathematics, the Environment, and Our Community Role

12:00 – 12:50   **Plenary Session**   **Room WA104**

Louis H. Kauffman - MAA Polya Lecture

Introduction to Knot Theory

Closing Remarks   **Room WA104**

Don Ransford, President, FTYCMA
Monika Vo, Vice-President for Programs, FL-MAA

1:00 – 3:00 Luncheon and FL-MAA Business Meeting

ABSTRACTS

Contributed Papers Session I

Jackie Copeland - State College of Florida, Manatee-Sarasota

Orange Grove and Orange Grove Open Text Books: The State of Florida Repository (your source for FREE materials and textbooks for your course)

Orange Grove and Orange Grove Texts Plus offer free objects that Instructors at our public colleges can use in their courses. This presentation will give an overview of what the repository provides and how to use the repository. It is especially important in the state of FL where Rule: 6A-14.092 Textbook Affordability applies. The presenter, Jackie Copeland, is an Orange Grove Scholar and Contributor as well as an Advocate and Trainer for CCOTC (Community College Open Textbook Collaborative) through Orange Grove.

Don Ransford - Edison State College

The road ahead for undergraduate Mathematics: Part II

The presenter will open the floor for a sharing of observations and ideas from the participants as a continuation of last year's session. The two main frames of reference will be addressing the question of "What is College-Level Mathematics?" and investigating possible reform models. Copies of last year's PowerPoint slides will be available for leaping off points in the discussion as well as enabling all interested parties to participate despite attendance at the 2009 presentation.

Rebekah Downes - University of North Florida

A Simple Mathematical Model of the Mammalian Auditory Pathway

This talk/project will show some interesting features of a simple mathematical model of the auditory system. This begins with the physiological background of the auditory system in mammals that carries an acoustic signal into a spatial pattern of neural firing. This process can be modeled using the clock model as well as Voltage Control Oscillators; with these we can study the relationship between frequency and voltage in neurons. These patterns are processed by various nuclei that extract assorted data and the emerging pattern of neuron firing is carried to the brain.

Daniel Dreibelbis – University of North Florida

Curves and Surfaces from 3-D Matrices

Given a 3-D array (better known as a tensor), there exists a trio of curves (or surfaces, or hypersurfaces, depending on the size of the tensor) that are specially defined by the tensor. Our aim is to motivate the definition of these curves, understand what they look like through computer graphics, see how they are related to one another, and try to classify them up to some equivalence. We emphasize the 3x3x3 case, where the defined curves are frequently elliptic curves, and thus gain all of the associated structure.

Timothy Holifield - Stetson University

Nonlinear Interactions in a Fiber-Optic Cable

We examine a system of partial differential equations modeling the interactions of two electro-magnetic field envelopes traveling down a fiber-optic cable in adjacent channels. We apply Hamilton's Principle to find approximate solutions, which we then use to find exact solutions which represent regions of coherent beams of light.

James Condor - State College of Florida

Using Trigonometry to Gain a Higher Level of Consciousness

This is a hands-on presentation of how to create basic Islamic designs using geometric techniques. Participants will be shown how to relate trigonometric concepts to ancient practices of Islamic design using mathematical computer software.

Helen P. Gerretson - University of South Florida

Using Literacy Strategies in the College Mathematics Classroom

The current call for reform in mathematics education in the United States by the National Council of Teachers of Mathematics (NCTM), the Mathematical Association of America (MAA), and the American Mathematical Association of Two-Year Colleges (AMATYC) promotes a shift from teacher-centered lecturing to student-centered problem solving. Mathematics courses are increasing emphasizing the ability to convey ideas clearly, both orally and in writing; similarly, changes in the workplace increasingly demand the ability to collaborate and communicate. As such, this session will explore specific ideas on how to incorporate literacy (reading, writing, speaking, listening, viewing) strategies into mathematics instruction. Attendees will engage in activities to expand their teaching repertoire.

Dennis C. Runde - State College of Florida

How Many Points is "Let x = Dennis's speed" Worth? Or Grading Problem Solving Using a Rubric

When issuing partial credit for problem-solving activities, a grading rubric can be employed to ensure consistency across various problem types. This talk will briefly introduce a rubric that was used in Dr. Runde's doctoral dissertation to grade word problems. The majority of the time will be spent in a collaborative setting while participants grade real problems submitted by students. References to research will be provided and all handouts will be available online.

Contributed Papers Session II

Jackie Copeland - State College of Florida, Manatee-Sarasota

Educating Our Students for <u>Their</u> Future: Using Technology in College Math Curriculum

Technology is developing rapidly. As Educators, we can demonstrate to our students how to connect Mathematics to Technology. Through effective and appropriate use of FREE and Existing Web 2.0 technologies, we can enhance our curriculum to increase student retention, and give our students real world skills they can take with them. This

presentation will provide examples of where and how to use technology for levels of mathematics from Basic Algebra through Linear Algebra. It is intended for both traditional seated courses as well as online courses.

Wendy Perry - University of Tampa

Using Adobe Flash Animations to Teach College Algebra

For several years I have used PowerPoint presentations to teach College Algebra. This semester I added Adobe Flash animations to the PowerPoint presentation. Flash adds interest and focuses attention on important concepts. The animation pulls the students into the lesson and gives additional visual memory clues.

Danielle Wilson – Stetson University

Lie Symmetries of Differential Equations

In this talk we will examine the utilization of Lie group symmetries in nonlinear and more challenging linear differential equations in obtaining characteristics of the behavior of their solutions. We also consider the utilization of Noether's Theorem to establish conservation laws and aid in solving more challenging differential equations.

Stephen Rowe - Wilkes Honors College Florida Atlantic University

On Property P_1 and Spaces of Operators

A problem posed by David Larson asks whether every subspace with property P_1 is two-reflexive, or equivalently, is its preannihilator the closed span of rank ≤ 2 operators. A space of operators $S \subseteq M_n(\mathbb{C})$ is said to have property P_1 if every element of $M_n(\mathbb{C})$ can be written as a rank-1 matrix plus an element of the preannihilator of S. The preannihilator $S_\perp$ is the set of all operators f, such that $Tr(fs) = 0$ for every $s \in S$. We investigate the structure of spaces that have property P_1. We say an algebra A is a maximal P_1 algebra if there does not exist any algebra containing A that also has property P_1. We show that semi-simple algebras always have property P_1 and that when $A \subset M_n(\mathbb{C})$ is a semi-simple algebra with dimension n, then A is a maximal P_1 algebra.

Shanzhen Gao - Florida Atlantic University

Patterns in Walks and Paths

Patterns in Walks and Paths have been considered by many mathematicians. We will present some new challenges coming from lattice paths, some types of walks, for example self-avoiding walks.

Amy Mihnea - Florida Atlantic University

Patterns for derangements with a single cycle

We find a general formula for the distribution of the δ-transformation for all derangements of order n with a single cycle, considered in one-line notation. The algorithm was obtained by studying patterns in the unique outputs, obtained from the Burrows-Wheeler Transform for all possible permutations of order n. We start with an initial distribution and then subtract appropriate elements by making connections with indices in appropriately constructed matrices. We also find some interesting rules and patterns related to these derangements.

William Dentinger – Saint Leo University

How using MyMathLab® in an introductory Statistics class effect the final grades?

Is there a difference between final exam scores in Introductory Statistics when students used the online mediated learning MyMathLab® as compared to scores during semesters when MyMathLab® was not used? MyMathLab® is an online resource implemented by instructors in different institutions with the intent to ultimately enhance the performance of the student in the classroom. The effectiveness of the product can be explored by comparing the final exam scores of students in sections that use MyMathLab® versus sections that do not. Using the data of two different semesters, one where MyMathLab® was utilized and one where it was not, the comparison will conclude if there is indeed a difference when using MyMathLab®. The data will come from the final exam scores of Introductory Algebra in the fall 2008 and the fall 2009 semesters.

Louis Concillio – Saint Leo University

Finding integer partitions using different programs

How many partitions does a positive integer have? In this talk, we shall discuss some computer programs which find the number of partitions for an arbitrary positive integer. We shall investigate our intent to improve on the computation time. We will look at a program which computes the partitions of a positive integer using the recursive algorithm. Then we will discuss our goal to achieve faster results.

Joy D'Andrea – University of South Florida

Describing Some Polyhedra and their Symmetry groups

A polytope is a geometrical figure bounded by portions of finitely many lines, planes, or hyperplanes. In two dimensions it is a polygon, in three a polyhedron. A polyhedron is a bounded intersection of finitely many half-spaces. We study the symmetries of a polyhedron to help us understand the structure of the polyhedron, where a symmetry is a motion that leaves the polyhedron unchanged. In this talk the author will present some examples of Polyhedron's and their symmetry groups.

Katherine Vecchi – Saint Leo University

Parachuting Behavior of Dendrobaties pumilio when Dropped from Primary Forest Canopy of Isla Colon, Panama

Dendrobaties pumilio, a strawberry dart frog, is known to carry their tadpoles to the tops of the canopy and place them into bromeliad plants. The mother then returns to these nurseries, over thirty meters in the air, to feed the young. To better understand these animals' behavior of returning back to the ground, a test was conducted comparing male and female *Dendrobaties pumilio* to two common terrestrial frog species in the area, *Colostethus sp.* and *Eleutherodactylus sp.* The physical morphologies of the frogs were compared to their descending time and behavior from a location of thirty – two meters above the ground, through a two – independent mean test. It was discovered that there was sufficient evidence to conclude that both sexes of *Dendrobaties pumilio* have evolved instinctual parachuting behavior not only for brooding behavior but also for a terrestrial and arboreal lifestyle.

Contributed Papers Session III

Ken Mulzet - Florida State College at Jacksonville

An Eigenvalue Approach to Rotation of Axes in Two Dimensions

The topic of conic sections is typically first encountered in a precalculus course, first using translation of axes to find the center of the conic in question, then introducing a rotation of axes. In two dimensions the general quadratic form has a rotation term involving a nonzero xy term, which is eliminated using a suitable rotation of axes. This method is heavily reliant on trigonometry and unwieldy formulas to determine the angle of rotation and new coefficients of the rotated conic. A different approach is possible using linear algebra, and this method uses an algebra based approach, calculating the eigenvalues and eigenvectors of a 2x2 matrix. We will explore this idea and along the way see that some of the properties of the quadratic form that are taken more or less for granted in the trigonometric approach will become clearer in the eigenvalue approach.

Scott Hochwald – University of North Florida

Too much Pi

There are many expressions that are connected to pi in some way. This talk will highlight the ones that tend to make people say "no way". None of the expressions are new, but many are not well publicized.

Julie Miller - Daytona State College

"The Grapes of Math," Investigating Mathematics in Literature

Join the presenter to investigate some delightful mathematical inconsistencies presented in familiar works of literature, including Gulliver's Travels, Dracula, and Journey to the Center of the Earth. Then apply these ideas to projects for Prealgebra through Precalculus.

Justin Owen - Wilkes Honors College, Florida Atlantic University

Boundary Value Problems on the Sierpinski Gasket

We present some results on boundary value problems for fractal differential equations defined on a domain in the Sierpinski Gasket whose boundary consists of a point and a line segment. The results include a mapping between Dirichlet boundary data and Neumann boundary data using function spaces defined in terms of Haar function expansions. We also show that the graph energy of a harmonic function can be expressed in terms of the Haar coefficients of its boundary values. A method for experimentally finding the eigenfunctions and eigenvalues of the Laplacian defined on the domain with either Dirichlet or Neumann boundary conditions is described.

Isaac DeFrain - Wilkes Honors College, Florida Atlantic University

Classifying Subspaces of L_p with Alspach Norm

In 1999, Dale Alspach introduced a new norm which is given by partitions and weights of a countable set. This new approach allows for a sequence space realization of function spaces and is a useful tool for analyzing and classifying subspaces of L_p. In this report we show that the Alspach norm is stable under tensor products. We've also have made progress in the classification of subspaces of L_p with the Alspach norm.

Steve Blumsack –Florida State University

Finding the Best Point: Integrating Algebra, Geometry and Statistics for Grades 7-16

Making sense, coherency, and reasoning are among the ideas that have received attention in recent years in many articles focusing on the mathematics curriculum. This presentation will introduce several problems that illustrate how these aspects can be infused into mathematics classes. The fundamental task is to determine the point that optimizes some criterion in a prescribed context; one example is the determination of the best location for two bus

stops. The problems, which have been used successfully in a summer gifted program for high school students, are rich in the sense that elementary aspects are suitable for middle school students and advanced generalizations provide intriguing opportunities for advanced undergraduate mathematics majors. Alignment with NCTM recommendations for content and process will be addressed. Implementation of strategies using physical models and computer software will be indicated.

Heather Edwards - Seminole State College

SCC Advance: Strengthening the Foundation of STEM Education for Seminole Community College Students

SCC Advance is an NSF funded program in partnership with the University of Central Florida. The focus of SCC Advance is to promote calculus preparedness for students pursuing a degree in a science or engineering field. The primary offering of this program is a sequence of interdisciplinary, team-taught courses examining various applications of mathematics in the sciences. While SCC Advance students take College Algebra, Trigonometry, and Precalculus, the students also take the one-credit hour applications course offered for their respective mathematics course. These applications courses are taught between mathematics, biology, chemistry, and physics faculty. Materials developed for the course sequence will be shared in the presentation.

Contributed Papers Session IV

Patrick Bibby - University of Miami

An Intermediate Value Property For Directional Derivatives

When students study directional derivatives, the typical problem they are asked to solve is to calculate the derivative of a differentiable function f of two or three variables at a given point P in the direction of a given unit vector. Since the maximum and minimum answers possible are $\left\|\vec{\nabla}f(P)\right\|$ and $-\left\|\vec{\nabla}f(P)\right\|$, respectively, we might ask the following:

> If $\left\|\vec{\nabla}f(P)\right\| \neq 0$ and K is any real number between $\left\|\vec{\nabla}f(P)\right\|$ and $-\left\|\vec{\nabla}f(P)\right\|$, is there a unit vector in whose direction the derivative of f at P is K?

The answer is YES. This is the <u>Intermediate Value Theorem for Directional Derivatives</u>.
Once the existence of such a unit vector has been established, we may further ask:

> Is there more than one such unit vector?

The answer is YES. In fact, the presenter will show
> a. If f is a function of two variables, there are two such vectors.
> b. If f is a function of three variables, there are infinitely many such vectors. These vectors can be represented as a one-parameter family, where the parameter takes all values in the interval $[0, 2\pi)$.

Denis Bell- University of North Florida

Associative Binary Operations and the Pythagorean Law

We study the class of continuous binary operations acting on the set of positive real numbers, with the properties associativity, reducibility and homogeneity. We determine the form of all such operations. This theorem has applications to Euclidean geometry and leads to a surprising algebraic proof of the Pythagorean theorem.

Robert Lang -Wilkes Honors College, Florida Atlantic University

The Minimum Rank Problem for Chordal Graphs

The problem of determining the minimum rank of a graph has been an active area of research in combinatorial matrix theory over the past decade. Given a simple, undirected graph G on n vertices, the problem is to determine the minimum rank $mr(G)$ (or maximum nullity $M(G)$) over all real, symmetric $n \times n$ matrices whose nonzero off-diagonal entries occur in exactly the positions corresponding to the edges of G. From elementary linear algebra $mr(G)+M(G)=n$. Much has been said about graph decompositions such as cliques, cycles, complete bipartites, etc. In this talk, we mainly care about the cliques and clique-stars. A clique is an induced subgraph that is completely connected. A clique-star is a clique that is joined to an independent set of vertices. We note that all cliques have minimum rank of 1 and all clique-stars have minimum rank of 2. A chordal graph is one that does not have an induced k-cycle, k > 3. We will determine the minimum rank of chordal graphs with one clique and one clique-star or three cliques in the cover.

Sarah Crimi - Wilkes Honors College, Florida Atlantic University

Ultrasonic Transducers and Finite Element Modeling

When a voltage is introduced to pillars of piezoelectric material, they vibrate according to a number of properties that are characteristic to that material. We discuss an example of a transducer consisting of layers of different material and then model this transducer with coupled harmonic oscillators. We also discuss the theory behind the software that creates more elaborate transducer models. This method, Finite Element Modeling, solves partial differential equations through numerical techniques.

Megan Beddow – Florida Southern University

Collectionwise weak continuity duals

Chuck Lindsey - Florida Gulf Coast University

Tools for Drawing Conic Sections

The classical compass and straightedge, whose use as geometric tools is familiar to everyone, provide the means to "solve" certain algebraic problems using only straight lines and circles. Less well known is the use of conic sections to similarly "solve" a broader class of algebraic problems, and the tools that have been developed to draw them. In this talk we will review the role of conic sections in solving algebraic problems, and look at a sampling of devices that have been described and/or actually built over the years to accurately draw conic sections.

Steve Boast - Lake Sumter Community College

Effective use of the tablet pc in the mathematics classroom

The presenter will share three years of experience using a tablet pc as his primary teaching tool. Participants will learn the basic operations of a free software program, how to import various documents and design, edit, and save lessons, and how to incorporate TI's Smartview.

Contributed Papers Session V

John Squires and Karen Wyrick - State Community College, Cleveland, Tennessee

Do the Math! Increasing Student Engagement and Success through Course Redesign

Do the Math, 2009 Bellwether Award winner and featured in The Chronicle of Higher Education, is a course redesign project in math that has seen significant improvements in student success. Strategies to increase student engagement will be discussed. Innovative scheduling strategies that are possible through course redesign will be presented.

Salam Khan – Florida State University

Mathematical model of conflict and cooperation

First we introduce a conflict model for non-annihilating multi-opponent and consider the associated dynamical system for a finite collection of positions. Opponents have no strategic priority with respect to each other. The conflict interaction among the opponents only produces a certain redistribution of common area of interests. The limiting distribution of the conflicting areas is investigated. Next we extend our conflict model to conflict and cooperation model, where some opponents cooperate with each other in the conflict interaction. Here we investigate the evolution of the redistribution of the probabilities with respect to the conflict and cooperation composition, and determine invariant states by using computer simulation.

Mike Keller - St. Johns River Community College

History of Cubic Equations

The history of solving cubic equations will be presented. The talk will focus mostly on the characters of Tartaglia and Cardano.

Leonard J. Lipkin - University of North Florida

Let's Read the News with our Students

For many years we have heard the phrase "quantitative literacy", and more recently we have heard the phrase "critical thinking". We, as mathematicians and statisticians, should be involved in these issues. And, it's easy and (I believe) very useful for our students. The newspapers, internet news, TV news, and other publications are full of data, numbers, and words. So much of it is misleading or downright incorrect. We will look at a few samples of this material and talk about how we can help.

Ben Fusaro- FSU

Mathematics, the Environment, and Our Community Role

The constant battle in Florida between developers and civic or environment organizations presents many opportunities to contribute to our communities and to show that mathematics is useful. How? By being a volunteer consultant for organizations such as Audubon, the Sierra Club, or for local civic groups. A college mathematics teacher with an elementary knowledge of chemistry or physics is in a good position to help. Most issues require little beyond a rudimentary knowledge of geometry, probability, growth functions, and skill in representing issues and results in visual form. It's is easy to analyze, explain or present an issue to individual or small groups. Doing the same at a public hearing is more of a challenge but the process is similar to making a presentation to colleagues. At

a hearing, the developers' experts are often biologists or engineers (often used to impress the commissioners and audience) but they have a healthy respect for mathematicians with a graduate degree. I will give suggestions on getting started as a volunteer consultant and will provide several examples from my own 12 years of experience. The examples will deal with such issues as protecting cypress trees from being turned into mulch, saving a stream from being entombed, & defeating a polluting power plant.

Plenary Sessions

David Bressoud – President, Mathematical Association of America

Bio: David Bressoud is DeWitt Wallace Professor of Mathematics at Macalester College and President of the Mathematical Association of America. He served in the Peace Corps, teaching math and science at the Clare Hall School in Antigua, West Indies before studying with Emil Grosswald at Temple University and then teaching at Penn State for 17 years. He chaired the Department of Mathematics and Computer Science at Macalester from 1995 until 2001. He has held visiting positions at the Institute for Advanced Study, the University of Wisconsin-Madison, the University of Minnesota, Université Louis Pasteur (Strasbourg, France), and the State College Area High School. David has received the MAA Distinguished Teaching Award (Allegheny Mountain Section), the MAA Beckenbach Book Award for *Proofs and Confirmations*, and has been a Pólya Lecturer for the MAA. He is a recipient of Macalester's Jefferson Award. He has published over fifty research articles in number theory, combinatorics, and special functions. His other books include *Factorization and Primality Testing, Second Year Calculus from Celestial Mechanics to Special Relativity, A Radical Approach to Real Analysis* (now in 2nd edition), *A Radical Approach to Lebesgue's Theory of Integration*, and, with Stan Wagon, *A Course in Computational Number Theory*.

Issues of the Transition to College Mathematics

Over the past quarter century, 2- and 4-year college enrollment in first semester calculus has remained constant while high school enrollment in calculus has grown tenfold, from 50,000 to 500,000, and continues to grow at 6% per year. We have reached the cross-over point where each year more students study first semester calculus in US high schools than in all 2- and 4-year colleges and universities in the United States. There is considerable overlap between these populations. Most high school students do not earn college credit for the calculus they study. This talk will present some of the data that we have about this phenomenon and its effects and will raise issues of how colleges and universities should respond.

Natasha Jonoska - University of South Florida

Bio: Natasha Jonoska earned her Ph.D. from SUNY Binghamton in 1993. She has been a faculty at USF since August of 1993 and a full professor at USF since 2006. She has over 70 publications and has been funded by the National Science Foundation continuously since 2000. She has been awarded the tulip award for the DNA computing scientist of the year in 2007. She had six PhD students graduate under her advisement.
She serves on editorial boards of several journals; has been the chair of the steering committee for the annual DNA based computing conference; organized and been in program committees of many conferences; as well as has given many invited lectures and short courses around the world including courses in Chile, Italy, Spain, England.

DNA rearrangements through spacial graphs

Motivated by recent models for DNA rearrangements we investigate smoothings on graphs that consist of 4-valent rigid vertices, called assembly graphs. An assembly graph can be seen as a representation of the DNA during certain recombination processes in which 4-valent vertices correspond to the alignment of the

recombination sites. A single gene is modeled by a polygonal path in an assembly graph. A polygonal path makes a ``right-angle'' turn at every vertex, defining smoothing of the 4-valent vertices and therefore modeling the recombination process. We investigate properties of these graphs, smoothing of their vertices, and the relationship to known smoothing in virtual knot diagrams.

Louis H. Kauffman - MAA Polya Lecture

Bio: Louis Kauffman has a PhD in Mathematics from Princeton University (1972) and has been teaching at the University of Illinois at Chicago since 1971, with visiting appointments at the University of Michigan, Universidad de Zaragoza, Spain, Universita di Bologna, Italy, the Institute des Hautes Etudes Scientifiques in Bures Sur Yvette, France, and others. He is particularly interested in algebraic topology, knot theory and formal diagrammatic systems; and his research in knot invariants and virtual knot theory opened up new fields of inquiry. He published several books including four on knot theory (by Princeton University Press and World Scientific Press). Kauffman received many awards including 1993 Warren McCulloch Memorial Award from the American Society for Cybernetics and the 1996 award from the Alternative Natural Philosophy Association (for contribution to the understanding of discrete physics). In 2005-2008 he was President of the American Society for Cybernetics.

Introduction to Knot Theory

Classical knot theory is the study of embeddings of a single circle (knots) or multiple disjoint circles (links) into Euclidean three-dimensional space. There are infinitely many different such embeddings up to topological defomation, reflecting the complexity (that we all know) of knotting and weaving of rope and yarn in the three-dimensional space of our experience. This talk will discuss how mathematical models for knots are constructed and how we investigate relationships between knotting and other subjects such as knotted DNA molecules in molecular biology and the structure of elementary particles.The subject of knot theory has a remarkably long reach into other subjects, mathematical and scientific. Rope tricks will be performed, but it is NOT expected
that the lecturer will disappear into 4-space.

SPECIAL THANKS TO

The Conference Committee:

Bettina Capuano, Dave Yonutas, Jeff Isaacson, Marilyn Eisenberg, Nazie Azarnia, Byron Dyce, Bruce Teague, Pam Pieters, Steve, Grosteffon

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