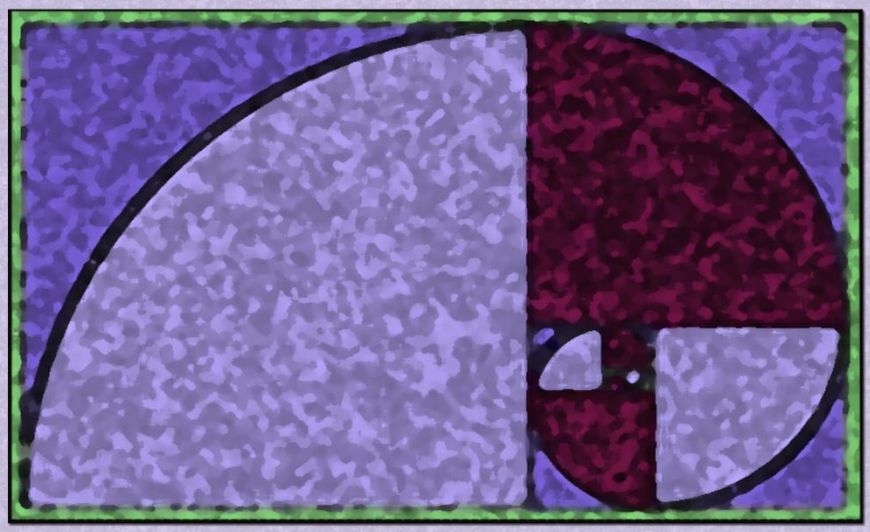
2011
Joint Meetings
of the Florida Section
of the Mathematical Association of America
and the Florida Two-Year College
Mathematics Association



Fibonacci Spiral

February 11 &12, 2011

Valencia Community College, East Campus

Florida Section of the Mathematical Association of America

Executive Committee 2010 – 2011

Governor	Mike Mears, State College of Florida
President	Charles Lindsey, Florida Gulf Coast Univ.
Past President	Pam Crawford, Jacksonville University
Vice-President for Programs	Daniela Genova, University of North Florida
Vice-President for Site Selection	Jacci White, Saint Leo University
Secretary-Treasurer	John Waters, Jr., State College of Florida
Newsletter Editor	David Kerr, Eckerd College
Coordinator of Student Activities	Julie Francavilla, State College of Florida
	Christina Dwyer, State College of Florida
	Janet Samuels, State College of Florida
Webmaster	Altay Özgener, State College of Florida
President-Elect	Monika Vo, Saint Leo University
Vice-President-Elect, Programs	Sidra Van de Car Valencia Community College
Vice-President-Elect, Site Selection	Joni Pirnot, State College of Florida

Florida Two-Year College Mathematics Association

Executive Committee 2010-2011

President	D. Rick Pal, Valencia Community College
Past President	Don Ransford, Edison State College
Vice-President for Programs	Bill Hemme, St. Petersburg College
Secretary	Janet Campbell, Palm Beach State College
Treasurer	Byron Dyce, Santa Fe College
Newsletter Editor	D. Rick Pal, Valencia Community College
Membership Chair	Ryan Kasha, Valencia Community College
Webmaster	Altay Özgener, State College of Florida
Historian	Mike Mears, State College of Florida
President-Elect	Penny Morris, Polk State College

Future Joint Mathematics Meetings FL-MAA/FTYCMA

February 10-11, 2012, University of North Florida
February 8-9, 2013, University of Tampa

PROGRAM

Friday, February 11, 2011

Committee Meetings and Workshops

9:30 - 11:00	FL – MAA Executive Committee Meeting	Room 3-143
10:00 – 10:50	FTYCMA Officers' Meeting	Room 5-111/5-112
11:00 – 1:30	FTYCMA Annual Business Meeting and Luncheon	Room 5-111/5-112

11:00 – 6:15 **Registration** Room 3-Atrium

Sign in and browse the displays from several publishing companies.

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

Ruth Prather, Provost, Valencia Community College, East Campus
Donna Saye, Vice-President, AMATYC Southeast Region
D. Rick Pal, President, FTYCMA
Charles Lindsey, President, FL-MAA

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

Paul Zorn, President, Mathematical Association of America

Picturing Analysis

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

3:00 - 3:45 **Timothy Jones**, Edison State College Room 3-113

Using Transcendence Proofs for Irrationality
Proofs for e and π

3:00 – 3:45 **Milé Krajcevski**, University of South Florida Room 2-304

What is a Random Group?

3:00 – 3:45	**Gisela Acosta, Margie Karwowski** Valencia Community College *Professor, Please Teach Me Applications I Can Relate to!*	Room 2-305B
3:00 – 3:20	**Richard Tamburro**, Daytona State College *Fuzzy Logic, Fuzzy Truth Tables and Deterministic Vagueness*	Room 4-147
3:00 – 3:20	**Faiz Al-Rubaee**, University of North Florida *The University of North Florida Mathematics, Science, and Engineering Summer Camp (MSESC)*	Room 4-149
3:00 – 3:20	**Sandra Campbell, Frederique Drullion** Embry-Riddle Aeronautical University *Team Teaching in Calculus I: A Report on a Team Teaching Experience*	Room 3-124
3:25 – 3:45	**Paul Goethals**, Graduate Student Clemson University *A Nonlinear Optimization Approach to Complex Engineering Systems*	Room 4-147
3:25 – 3:45	**Bariaa Shatila**, Flagler College *Formative and Summative Assessments in Mathematics*	Room 4-149
3:25 – 3:45	**Sharmistha Chakrabarti, Ibrahima Kaba, Jayathi Raghavan** Embry-Riddle Aeronautical University *Improving Assessment Tools Using the Index of Learning Styles (ILS)*	Room 3-124

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

4:00 – 4:45	**Patrick Bibby**, University of Miami *Sequences: Linear Recursions and Characteristic Equations*	Room 3-113

4:00 – 4:45	**JoAnn Lewin, Laurice Garrett** Edison State College *Improving the Teaching of College Mathematics Through Faculty Development*	Room 2-304
4:00 – 4:45	**Dennis Runde**, State College of Florida *Ten (or More) Simple Ways to Be More Time Efficient in the Math Classroom*	Room 2-305B
4:00 – 4:45	**Don Ransford**, Edison State College *A Reexamination of the Computation Skills Requirement of the Gordon Rule*	Room 3-124
4:00 – 4:20	**Richard Tamburro**, Daytona State College *Art Meets Math: Statistical Research and Film Making*	Room 4-147
4:00 – 4:20	**Justus Frazier**, Valencia Community College *The Four Faces of Knowledge*	Room 4-149
4:25 – 4:45	**Greg Spradlin** Embry-Riddle Aeronautical University *Minimizing the Protraction Integral*	Room 4-147
4:25 – 4:45	**Amanda Saxman**, Valencia Community College *The Parabola Project: Using a Non-Lecture Approach to Teach Quadratics*	Room 4-149

3:00 – 6:15	**Student Events**	Room 4-ASC
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 Room 3-143 is a Student Hospitality room.
Feel free to come and join other students here!

3:00 – 6:15 **Workshops** Room 2-203

3:00 – 3:45 **Nancy Johnson, C. Altay Özgener**
State College of Florida

LaTeX 2011 Workshop

4:00 – 4:45 **Chris Niemann,** Southwestern Illinois College

The Riemann Hypothesis – The Zeta Function (Analysis)

5:30 - 6:15 **Chris Niemann,** Southwestern Illinois College

The Denjoy Probabilistic Model (Number Theory)

4:45 – 5:30 **Conference Break**

Please visit the textbook publishers in room 3-Atrium and browse their displays.

4:55 – 5:25 **Governor's Session** Room 3-113

Mike Mears, State College of Florida

Top 10 Things You Should Know about the MAA (but were afraid to ask)

This informational sharing session is a chance for you to not only receive updates about the policies and direction of the MAA, but to provide input into how the organization can better serve its members. The session will be interactive, including family pictures.

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

5:30 - 6:15 **Scott Hochwald**, University of North Florida Room 3-113

Name That Curve

5:30 – 6:15 **Nazarré Merchant**, Eckerd College Room 4-147

The Logic of Grammatical Systems: Using the Grammar to Learn

5:30 – 6:15 **Monika Vo, Maria Acosta-**Undergraduate Student Room 4-149
Saint Leo University

Math Circles

5:30 – 6:15 **Martha Goshaw**, Seminole State College Room 2-304

Visualizing the Central Limit Theorem Using Real Data

5:30 – 6:15 **Jacqueline Copeland**, State College of Florida Room 2-305B

Collaborative Groups in Online Math Courses

5:30 – 6:15 **Lisa Armour, James Lang** Room 3-124
Valencia Community College

Reflections from Members of the Carnegie Foundation's Statway™ Collaboratory

6:30 – 8:30 Conference Banquet and Awards Ceremony Room 5-Cafe

Saturday, February 12, 2011

9:00 – 9:50 Plenary Session Room PAC

Catherine Bénéteau, University of South Florida

Discrete Wavelets and Image Compression

10:00 – 10:45 Contributed Papers Session IV

10:00 – 10:45 **James Condor**, State College of Florida Room 3-113

Gothic Architecture and Piecewise Defined Functions

10:00 – 10:45 **I. A. Sakmar**, University of South Florida Room 4-147

Certain Class of Numbers Related to Fermat's Equation

10:00 – 10:45 **Cynthia Young**, University of Central Florida Room 4-149

Engaging Students In The Precalculus Suite Of Courses: MAC 1105, MAC 1114, MAC 1140, and MAC 2147

10:00 – 10:45 **Anthony Okafor**, University of West Florida Room 2-304

A Study of College Readiness for College Algebra

10:00 – 10:45 **Eric Torres**, Santa Fe College Room 2-305B

Frugal Friendly Technology

10:00 – 10:45 **Tony Planas**, Florida Gulf Coast University Room 3-124

The Metric System: A Real Reform in Our Educational System

10:00 – 10:45 **Lisa Rickel**, Hawkes Learning Systems Room 2-203

Motivate Your Students with Mastery Learning

11:00 – 11:45 Contributed Papers Session V

11:00 – 11:45 **Daniel Dreibelbis**, University of North Florida Room 3-113

Fractals from Root-Solving Methods

11:00 – 11:45 **Rita Lindsay, Deanna Voehl** Room 2-304
Indian River State College

Intermediate Algebra-What Works at IRSC!

11:00 – 11:45 **Tammy Bevins**, Hillsborough Community College Room 2-305B

Creative Ways to Introduce New Topics in Liberal Arts Mathematics Courses

11:00 – 11:45 **Ben Fusaro**, Florida State University Room 3-124

Mathematics and Environmental Activism

11:00 – 11:20 **Robert Browning**, Undergraduate Student Room 4-147
University of West Florida

Primes in Arithmetic Progressions

11:00 – 11:20	**Carrie Grant**, Flagler College *Using Class Data to Actively Engage Students In an Introductory Statistics Course*	Room 4-149
11:25 – 11:45	**Bruce Cutler**, Undergraduate Student Saint Leo University *Topological Properties of the Adidas Jabulani Soccer Ball*	Room 4-147
11:25 – 11:45	**Mike Nancarrow, Bob Hollister, Nisse Goldberg**, Jacksonville University *A Biocalculus and Statistics Course for Biology Majors*	Room 4-149

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

George Andrews, AMS President, MAA Pólya Lecturer

Adventures with Partitions

Closing Remarks

D. Rick Pal, President, FTYCMA
Charles Lindsey, President, FL-MAA

1:00 – 3:00 **FL-MAA Business Meeting and Luncheon** **Room 5-111/5-112**

ABSTRACTS

Contributed Papers Session I

Timothy Jones, Edison State College

Using Transcendence Proofs for Irrationality Proofs for e and π

Transcendence of a number implies the irrationality of powers of a number, but in the case of π there are no separate proofs that powers of π are irrational. We investigate this curiosity and show how transcendence proofs for e can be used to show e and its powers are irrational. These irrationality proofs for e motivate similar proofs for π and its powers. Transcendence proofs proper for both numbers easily follow from these irrationality proofs for powers.

Milé Krajcevski, University of South Florida

What is a Random Group?

In this talk we will reflect on the notion of a random group, giving three different definitions of a random group and state some interesting results related to small cancelation properties and hyperbolicity.

Gisela Acosta, Margie Karwowski, Valencia Community College

Professor, Please Teach Me Applications I Can Relate to!

Have you ever heard your students say: 'I hate word problems'? Why do so many students struggle with them? There are different factors ranging from difficulty in manipulating numbers, not understanding the skills and concepts, to feeling intimidated by these problems. Even students who have mastered the math competencies typically dislike math applications. Maybe there is another factor to consider: Many students simply find applications downright boring!!! Can we not present our students with an alternative to the nicely presented, but out-of-touch problems that many textbooks contain? This presentation addresses the need for applications based on current everyday life settings that are really interesting to college-age students. Participants will receive sample problems that they can use in their classrooms.

Richard Tamburro, Daytona State College

Fuzzy Logic, Fuzzy Truth Tables and Deterministic Vagueness

A comprehensive exploration of multi value logic, fuzzy truth table construction, fuzzy probability and the historic development of fuzzy logic and Boolean algebra.

Faiz Al-Rubaee, University of North Florida

The University of North Florida Mathematics, Science, and Engineering Summer Camp (MSESC)

This talk will address UNF's recent experiences in hosting Mathematics, Science, and Engineering Summer Camps (MSESC) for gifted as well as camps for underachieving students. The talk will address mainly the gifted and high achieving students' component of the camps. At this presentation our experiences in funding sources, target groups, students selection, and assessment will be shared. Additionally, the rules/constraints of the university and the public schools, and samples of enrichment and the standard based activities will be discussed.

Sandra Campbell, Frederique Drullion, Embry-Riddle Aeronautical University

Team Teaching in Calculus I: A Report on a Team Teaching Experience

Each semester, ERAU offers Calculus I to over 200 students. Improving performances and retention without lowering standards is always an issue. Consistency in the material taught and performances across the multiple sections, are checked by a common final. As eventually every instructor has to cover the same material this course is a good candidate for a 'team teaching" strategy. "Team teaching" was implemented in the preparation of the course as well as in the daily teaching practices. For the course preparation, instructors worked together on class material, midterms and schedule assuring a maximum of homogeneity between their classes without hurting their teaching styles. In the classroom, two team teaching practices were applied: exchanging classes for teaching specific topics and teaching together for some of the more challenging topics. Team teaching proved itself to have many advantages: the students are better prepared for a common final exam and the work load of each instructor is reduced.

Paul Goethals, Graduate Student, Clemson University

A Nonlinear Optimization Approach to Complex Engineering Systems

In the manufacturing environment, one or more quality characteristics are normally used to judge or evaluate a given product. For some characteristics, such as the amount of decibels or friction within a system, the objective is usually minimization and the target may be zero or very small. For other characteristics, such as durability and serviceability, the objective may be to maximize observations and the target may be very high or in some cases, infinity. Complex engineering systems may involve multiple characteristics with diverse objectives; in this case, the selection of an appropriate model for process or product optimization can be particularly problematic. This research specifically examines an alternative approach to modeling problems for multiple quality characteristics of different

type. A nonlinear programming routine with economic considerations is established to facilitate to identification of the optimal system settings. Several specific applications of this research are presented in greater detail.

Bariaa Shatila, Flagler College

Formative and Summative Assessments in Mathematics

Effective classroom assessment is essential to gather information about students' learning. When instructors are aware of their students' gaps in learning, they can then reduce the gaps between teaching and assessment. This presentation will include practices of Formative and Summative assessments that will enhance faculty assessments in their mathematics classrooms.

Sharmistha Chakrabarti, Ibrahima Kaba, Jayathi Raghavan
Embry-Riddle Aeronautical University

Improving Assessment Tools Using the Index of Learning Styles (ILS)

MA 241 and MA 242 are the two introductory calculus courses that most engineering students take to satisfy the general education requirements for mathematics at Embry-Riddle University. Our hypothesis is that the students learning styles has an impact on their responses to assessment instruments questions. In our study, for two consecutive semesters (Fall 2009 and Spring 2010) we collected data in the two courses on the students including (a) responses to the Index of Learning Styles (b) their itemized scores on the final exam in their course. This report includes the detailed outcomes of the study including the answers to the three project outcomes: the Learning Styles Distribution in the Courses, the cross-tabulation of students' learning styles versus their answers to assessment questions along with the questions that registered a bias on the Chi Square test and guidelines to improve the assessment instruments.

Contributed Papers Session II

Patrick Bibby, University of Miami

Sequences: Linear Recursions and Characteristic Equations

This is an introduction to a topic covered in some discrete mathematics courses. Given an infinite sequence defined by a linear recursion, its characteristic equation can be used to determine its nth-term formula. Examples of special cases will include (1) recursion formulas with one, two, or three initial values, (2) characteristic equations having repeated roots, (3) characteristic equations with nonreal roots, and (3) nonhomogeneous recursion formulas. Finally, this method will be applied to find the formula for the nth-term of the Fibonacci sequence which, in

turn, will be used to show that the limit of quotients of consecutive terms of the Fibonacci sequence is the golden ratio.

JoAnn Lewin, Laurice Garrett, Edison State College

Improving the Teaching of College Mathematics through Faculty Development

What do you do when professional development becomes an increasingly important part of faculty development? The presenters will discuss ways in which they were able to "customize" ideas from an MAA PREP workshop "Improving the Teaching of College Mathematics through Faculty Development" to initiate a mathematics faculty development series at Edison State College. What started as a targeted program for MAT1033 instructors in response to low success rates has grown to become a cooperative effort between College Prep and College level math faculty. Discussion will include rationale and logistics for such a program, seminar topics from the first semester and plans for the expansion of the program into a second semester. Time will be given at the end for sharing what other math departments are doing for faculty development.

Dennis Runde, State College of Florida

Ten (or More) Simple Ways to Be More Time Efficient in the Math Classroom

The discussion will focus on some very simple but effective strategies to maximize the time we spend in class with our students. We will include ways to incorporate online homework into the math classroom—even if you do not have computer access in the classroom. This discussion will conclude with a sharing session where participants can share their strategies of being more time efficient.

Don Ransford, Edison State College

A Reexamination of the Computation Skills Requirement of the Gordon Rule

A history of Florida Statute 6A-10.030, also known as the Gordon Rule, will be presented. This will be followed by an open discussion of its likely original intent, its validity in the 21st century, and possible alternative methods of assessing the desired, college-level skills.

Richard Tamburro, Daytona State College

Art Meets Math: Statistical Research and Film Making

Film making offers an innovative way to enliven the research component of a statistics class. As part of a research assignment, students create short, entertaining films. Student groups employ survey design, sampling, hypothesis testing, and a presentation of findings film. Artistic endeavors energize creative students who may otherwise retreat from statistical research.

Justus Frazier, Valencia Community College

The Four Faces of Knowledge

The *Four Faces of Knowledge* presentation demonstrates methods that empower educators, parents, and others who support students who struggle with math. Students are given tools to self-assess their knowledge of math subjects in four measurable categories: hidden, lost, false and true knowledge. Students are further empowered to self-correct flawed methodology and minimize the phenomena of 'going blank' thus becoming less anxious test takers.

Greg Spradlin, Embry-Riddle Aeronautical University

Minimizing the Protraction Integral

The problem of timing radiation treatments of malignant tissue while minimizing damage to healthy tissue leads to the mathematical problem of minimizing a double integral involving a function subject to several constraints. The problem has a unique solution, which can be verified using only basic calculus.

Amanda Saxman, Valencia Community College

The Parabola Project: Using a Non-Lecture Approach to Teach Quadratics

Many studies have confirmed that active learning provides deeper connections to course material. Implementing a story-based lesson that employs active learning by way of discovery and cooperative skills will allow many students to find greater success in retaining lesson concepts. In this session, participants will learn how to implement the Parabola Project, a story-based approach to teaching quadratics. The Parabola Project is a multi-step project that utilizes a non-lecture, story-based approach for the initial lesson. This initial lesson is then reinforced with technology by way of a calculator-program activity and with a group research/presentation activity. Participants will leave with materials they can immediately implement or adapt for the needs of their own classroom.

Contributed Papers Session III

Scott Hochwald, University of North Florida

Name That Curve

What is the curve formed by a hanging power line? What is the curve formed by a cable supporting a suspension bridge? What is a Pursuit Curve? What is the Brachistochrone Problem? What is the Tautochrone Problem? What was the first nontrivial curve? How can the nature of a general quadratic equation in two variables be determined? If you know the answers to these questions, then you

can probably give the talk. If you don't, then you can't look anything up until after I give the talk. The talk will present answers to these and other related questions and highlight the relevant history.

Nazarré Merchant, Eckerd College

The Logic of Grammatical Systems: Using the Grammar to Learn

Linguistic systems must capture language variation encountered cross-linguistically, and do so in a sufficiently constrained way so that a child learner can acquire any language it is exposed to in an efficient manner. In this talk I present a set of grammars (a grammar being a function from a lexical input space to a lexical output space) that captures encountered cross-linguistic variation in a language learning exploitable way. A learning algorithm is given that uses the logic of this function space, specifically the lattice-theoretic join on the entailment relations in the function space, that allows the learner to efficiently learn the language it is exposed to.

Monika Vo, Maria Acosta – Undergraduate Student, Saint Leo University

Math Circles

What is a math circle? In this presentation, we shall define what a math circle is and discuss our plan to implement one at Saint Leo University. We are looking for anyone interested in participating in our project, so come and share with us your experiences and your suggestions!

Martha Goshaw, Seminole State College

Visualizing the Central Limit Theorem using Real Data

The Central Limit Theorem can be a confusing concept for many introductory statistics students. The presenter will share several real data sets that she uses with her students when this concept is first introduced that help them understand the theorem.

Jacqueline Copeland, State College of Florida

Collaborative Groups in Online Math Courses

Student engagement in online mathematics courses can be challenging. Current Best Practices in online courses suggest that one method of energizing your online course may be via student-student collaboration. However, meaningful group work that is aligned to course performance standards can be difficult to implement in online courses. This workshop suggests several models, aligns them to Bloom's taxonomy and alerts Instructors to possible hazards of online group work.

Lisa Armour, James Lang, Valencia Community College

Reflections from Members of the Carnegie Foundation's Statway™ Collaboratory

The Carnegie Foundation for the Advancement of Teaching has formed a Collaboratory to design and pilot Statway™, a math pathway from developmental math to and through college statistics. The Collaboratory includes teams from nineteen colleges, Carnegie associates, and staff from the Charles A. Dana Center at the University of Texas at Austin. Members of the Collaboratory are piloting Statway™ lessons this year in order to refine them for student use next year. The lessons feature engaging problems that build students' conceptual understanding. Join us as we reflect on the content and style of the lessons, Carnegie's pilot lesson protocol, and this partnership's potential to improve instruction in mathematics.

Contributed Papers Session IV

James Condor, State College of Florida

Gothic Architecture and Piecewise Defined Functions

The relationship between geometry and Gothic Architecture will be covered briefly and then participants will transition from the compass and ruler to the computer to contrast and compare appropriate design techniques while focusing on building classroom activities for a variety of mathematics courses.

I. A. Sakmar, University of South Florida

Certain Class of Numbers Related to Fermat's Equation

In the study of Fermat's equation one encounters certain classes of numbers. These numbers are interrelated and have a large number of properties. Additionally, there are identities satisfied by these numbers which in themselves are interesting as they have connections to other relations like the Little Theorem of Fermat.

Cynthia Young, University of Central Florida

Engaging Students in the Precalculus Suite Of Courses: Mac 1105, Mac 1114, Mac 1140, AND Mac 2147

Examples of ways to engage precalculus students will be discussed: assigning a group project on global climate change, demonstrating to students where precalculus topics are important in calculus through a preview to calculus, and assisting students in developing physical intuition with inquiry-based real-world problems.

Anthony Okafor, University of West Florida

A Study of College Readiness for College Algebra

College readiness is a continuing topic of interest for high school students, educators, and parents in today's changing academic environment. We undertake a comparative study of student's performance in College Algebra for the fall 2007 and fall 2008. Assessment results from 2007 semester were used to make schedule shifts in 2008 so as to address areas of weakest performance. Our results show that students' performance improved significantly in 2008 when the curriculum developments were implanted. However, we identified some topics that continued to pose a challenge. To check the validity of our placement criteria, we also analyzed correlations between students' performance in College Algebra and the following four factors, cumulative college GPA, high school GPA, SAT scores in mathematics and ACT scores in mathematics. Results of our study are consistent with reports of other recent studies including that of Gore (2006). We proffer suggestions regarding curriculum development in College Algebra as well as placement criteria.

Eric Torres, Santa Fe College

Frugal Friendly Technology

I will demonstrate how to use low cost techniques to produce an online course with the primary purpose of having your class delivered with the same effectiveness online as onsite. All of this can be accomplished without the use of expensive tablet computers, elaborate smart rooms, or a recording studio. The secondary purpose is to demonstrate how some of these techniques can be used for effective use of office hours as well as in a Math lab.

Tony Planas, Florida Gulf Coast University

The Metric System: A Real Reform in Our Educational System

One of the problems right now with the dissemination of knowledge about the Metric System or SI is the "metric-phobia" in existence in many social sectors of our communities. Many of us are "metric-phobic" at this time, especially with two significance measures: *speed* and *weather temperature*: meaning mph against km/h and Fahrenheit degrees against Celsius degrees. Politicians, Higher Academic Institutions, and the media are major obstacles in providing the necessary support for a smooth transition to the Metric System making the U.S. a "metric" nation. I would dare to say that without the knowledge of the Metric System we are functional illiterates and the majority of the American People are completely blinded on this essential point of education. The Federal Highway Administration (FHWA) decided to eliminate metric symbols or metric signs from the new 2009

edition of the Manual on Uniform Traffic Control devices (MUTCD) effective January 2010.

Lisa Rickel, Hawkes Learning Systems

Motivate Your Students with Mastery Learning

Innovation in the classroom and implementation of technology in mathematics are proven practices to promote student success. Hawkes Learning Systems' unique approach to mastery learning provides the software solution to motivate your students to excel in math. Come learn how to integrate Hawkes in your courses for guaranteed success!

Contributed Papers Session V

Daniel Dreibelbis, University of North Florida

Fractals from Root-Solving Methods

Newton's Method is a cornerstone of numerical analysis: it is an incredibly fast method to find a root of an equation. When used to find the roots of an equation over the complex numbers, the sets of convergence become beautifully difficult, yielding the so-called "Newton fractals". These fractals are well-known, but what happens when we change our root-solving methods? In this talk, we modify the basic principle behind Newton fractals, discovering what happens when we mess with the original formula.

Rita Lindsay, Deanna Voehl, Indian River State College

Intermediate Algebra-What Works at IRSC!

This presentation will give an overview of Indian River State College and their Intermediate Algebra program. With a diverse student population coming from 5 counties, IRSC faculty are challenged to maintain their consistently high success rates in MAT1033. Part of this success is achieved through the required use of technology and online homework, common final exams, and offering a variety of delivery including 'fast-track' sections. Two IRSC faculty members will enthusiastically share recent statistics on enrollments, withdrawal and success rates, and faculty assignment in MAT1033. They will share best practices and strategies used by the Math Department and will demonstrate the computer software program they have been using for more than a decade. There will be time for a brief question and answer session immediately following the presentation.

Tammy Bevins, Hillsborough Community College

Creative Ways to Introduce New Topics in Liberal Arts Mathematics Courses

Liberal Arts Mathematics is a topics course in which the topics are generally unrelated. To assist in the transition to a new set of objectives, I have created a number of powerpoint slide shows that give a quick, yet entertaining preview of the new material. I use examples ranging from Harry Potter to workout shoes to engage students and make the course relevant.

Ben Fusaro, Florida State University

Mathematics and Environmental Activism

The struggles between civic/environment organizations and developers present opportunities to show that mathematics is useful to the community, something that these organizations are unlikely to recognize. Most local or regional civic/environmental issues require little beyond discrete math, geometry, or statistics. It is important to develop skill in putting issues and results in *visual* form. A basic knowledge of some domain field such as biology, chemistry or geology is essential. Speaking at public hearings can be intimidating, although it is not very different from giving a lecture to one's colleagues. The developers' experts are often experienced biologists or engineers, but they usually have a healthy respect for a mathematician with a graduate degree. I will give suggestions on getting started and will provide several examples from my own 12 years of experience. Most of the examples will deal with energy issues such as fossil fuels and various alternative energy sources.

Robert Browning, Undergraduate Student, University of West Florida

Primes in Arithmetic Progressions

In the 1800's, Lejeune Dirichlet proved that if a and b are coprime, there are infinitely many primes contained within the arithmetic progression ak + b, for k = 1, 2, 3, ... I will present a restricted case of this theorem, where a = 4 and b = 1. While this case may be restricted, it illustrates the general method used by Dirichlet to prove the more general theorem. We will briefly discuss a chronological history on the research of the primes. In addition, we consider a research question about two sequences arising from the prime factorization of integers.

Carrie Grant, Flagler College

Using Class Data to Actively Engage Students in an Introductory Statistics Course

Do you have a Facebook account? How many "friends" do you have on your account? In what year do you think the USA will have a female president? Do you text while driving? How many hours of sleep did you get last night? Data is everywhere and students like to look at data based on themselves and their classmates. It makes statistics come alive and be real. In this session, you will learn the benefits of going beyond the textbook examples to involve students in the learning process using data they own and investigate technology that can be used to gather class data. Student data can be used in the classroom, on quizzes, and on tests. Engage your students and they will succeed.

Bruce Cutler, Undergraduate Student, Saint Leo University

Topological Properties of the Adidas Jabulani Soccer Ball

I intend to discuss and examine the topological construction of the innovative Adidas Jabulani soccer ball, made popular through its use in the 2010 World Cup in South Africa. Using Euler's polyhedral formula, investigating the physical properties of polygons implemented in the balls construction will allow me to determine the uniqueness of the design employed. This presentation reports the preliminary findings from my undergraduate mathematical senior project at Saint Leo.

Mike Nancarrow, Bob Hollister, Nisse Goldberg, Jacksonville University

A Biocalculus and Statistics Course for Biology Majors

Presenters will describe development and implementation of a team-taught mathematics course designed for Biology students. The course focused on mathematical tools used to construct and analyze biological models, with examples drawn largely from ecology. Analytic techniques were complimented with the use of computer algebra systems to help develop intuition.

Workshops

Nancy Johnson, C. Altay Özgener, State College of Florida

LaTeX 2011 Workshop

LATEX is especially nice for typesetting mathematical work. It has beautiful mathematical fonts and extremely powerful tools for handling tables of contents/figures/etc, citations, bibliographies and indices. The interface is more like programming than the Word-like "WYSIWYG" approach, but the initial

learning curve is not too steep and is worth the effort. We will discuss the basics of certain presentation packages such as Beamer, PS-Tricks, TiKZ.

Chris Niemann, Southwestern Illinois College

The Riemann Hypothesis – The Zeta Function (analysis)

This workshop will use *Mathematica* to illustrate salient features of the Riemann zeta function. In analysis, we speak of the p-series that converges iff: $p > 1$. If p is replaced by s and one lets: $s = x + yi$, where: $x > 1$, the series converges. To compute values, where: $0 < x < 1$, we need the eta function. With the zeta function in terms of the eta function, the zeta function can extended into the critical strip. Riemann had a hunch that all imaginary zeros of the zeta function have a real part of one half. As an aid for finding these zeros, Riemann knew that there is a certain constant such that the sum of the reciprocals of all imaginary zeros of the zeta function must be equal to it. The graphing capability of *Mathematica* is used to illustrate the impact of this constant plus several examples of zeros of the zeta function are "seen in 3-D".

Chris Niemann, Southwestern Illinois College

The Denjoy Probabilistic Model (Number Theory)

Workshop II will also make extensive use of *Mathematica*, with many functions being presented. The "Denjoy Probabilistic Model of The Riemann Hypothesis" is as follows. Randomly select a number from the unbounded set of square-free numbers, and if you can prove that the probability of selecting a square-free number with an even number of factors is exactly 1/2, then you have proven the Riemann Hypothesis. The Primorial Triangle builds on the DPI and will be presented and explained. The Primorial Triangle organizes the number of square-free numbers less than successive primorials by their number of factors. In *Mathematica*, the function PrimePi[x] returns the number of primes less than or equal to x. Based upon the PrimePi[x] function, nine more user-defined functions will be presented. They return the number of square-frees with exactly 2 through 10 factors less than or equal to a given number.

Plenary Sessions

Paul Zorn, President, Mathematical Association of America

Bio: Paul Zorn was born in India, and had his primary and secondary schooling there. He did his undergraduate work at Washington University in St. Louis, and his Ph.D., in complex analysis, at the University of Washington, Seattle. Since 1981 he has been on the mathematics faculty at St. Olaf College, in Northfield,

Minnesota.

Paul's special interests, beyond complex analysis, include instructional computing and mathematical exposition. Combining these interests, he has written (with co-author Arnold Ostebee) a series of calculus textbooks that draw on computing to promote graphical, numerical, and symbolic viewpoints. In 1987 he received the MAA's Allendoerfer Award for an article on Louis de Branges' proof of the Bieberbach conjecture. He has also worked as editor for several issues of the American Mathematical Society's occasional publication What's Happening in the Mathematical Sciences. His most recent textbook, *Understanding Real Analysis*, was published in 2010 by A K Peters.

Much of Paul's MAA-related history centers on publications. His MAA-related editorial work includes service with FOCUS, the New Mathematical Library book series, and Mathematics Magazine, of which he was editor from 1995 to 2000. His two-year stint as MAA President begins in 2011.

Picturing Analysis

"Thinking in pictures" is standard operating procedure in teaching and learning geometry, graph theory, elementary calculus, and other visually rich areas of mathematics. Less obvious, but still valuable, are visual insights into key ideas and theorems from real and complex analysis. It's one thing to know what, say, differentiability and integrability mean, but how do they look? How do poles and essential singularities of complex functions look in color? Can countability be seen? I'll give examples and suggest implications for better teaching, learning, and understanding.

Catherine Bénéteau, University of South Florida

Bio: Catherine Bénéteau is an Associate Professor of Mathematics at the University of South Florida. She is originally from Montréal, Canada, and got her master's degree at McGill University and then her Ph.D. at the State University of New York, Albany, under the direction of Boris Korenblum, in complex analysis. She has previously taught at Seton Hall University, in New Jersey, and at the Center for Talented Youth, a program run by the Johns Hopkins University.

Her research interests involve extremal problems in analytic function spaces. She has also worked on integrating applications of mathematics such as wavelets and image processing into the undergraduate curriculum. She has team taught courses with faculty in the College of Education and has created professional development courses for elementary school teachers. She is a Project NExT fellow, and was recently awarded the 2009-10 Outstanding Undergraduate Teaching Award at the University of South Florida.

Discrete Wavelets and Image Compression

Wavelet theory was an immensely popular research area in the 1990's that brought together ideas from people working in completely different areas such as electrical engineering, physics, mathematics, and computer science. Even in mathematics, the subject attracted researchers from real and harmonic analysis, statistics, and approximation theory. Applications of wavelets turn up in lots of different places such as identifying art or handwriting forgeries, JPEG2000 image compression, and FBI fingerprint storage algorithms, among others. In this talk, I will show you how simple the Discrete Haar Wavelet transform is, how it can be used in image compression, and its connections to some beautiful mathematics.

George Andrews, AMS President, MAA Pólya Lecturer

Bio: George E. Andrews is Evan Pugh Professor of Mathematics at Penn State University and an expert on the theory of partitions. He has a long-term interest in the work of S. Ramanujan, whose last notebook he unearthed in 1976. He is now collaborating with Bruce Berndt on a series of volumes explicating the brilliant and sometimes enigmatic ideas in this notebook.

Andrews has received many awards for his teaching and service to the profession. These awards include the Allegheny Region Distinguished Teaching Award from the MAA, and the 1999 Centennial Award from the Department of Mathematics at the University of Pennsylvania "in recognition of (his) contributions to pure mathematics and mathematics education." In 2007, he was one of three finalists nation-wide for the Robert Foster Cherry Teaching Award for Great Teaching. He became President of the American Mathematical Society in 2009.

His research has also received recognition. Andrews was elected to the American Academy of Arts and Sciences in 1997, and to the National Academy of Sciences (USA) in 2003. In 2009, he was selected SIAM Fellow. He holds honorary degrees from the Universities of Parma, Florida, and Waterloo.

Adventures with Partitions

The theory of partitions is forever intriguing because it has both simplicity and surprise. On the one hand, it is the study of writing integers as sums of integers. What could be simpler? On the other hand, it is tied to applications stretching from spiral, self-avoiding walks to random graphs to unsolved questions in positivity. AND its history is deeply entwined with the work of the Indian genius, Ramanujan. In this talk, I shall try to convey some of the excitement and surprise of this venerable subject by examining a few of the topics I have mentioned.

XLIV Joint Meetings of the

Florida Section of the

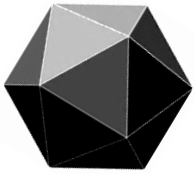
Mathematical Association of America

And the

Florida Two-Year College Mathematics Association

Valencia Community College, East Campus

February 11-12, 2011



SPECIAL THANKS TO

Valencia Community College, East Campus

The Organizing Committee

Joel Berman, Roger Corriveau, Ann LaPietra, Maryke Lee,
Landon Shepard, James Wells

Vendors and Publishers

Cabin Creek Catering
Addison-Wesley, Cengage Learning, Hawkes Learning Systems,
McGraw-Hill Higher Education, Pearson Higher Education, John Wiley & Sons