2016 Joint Meetings
Of The
Florida Section
Of The
Mathematical Association of America
And The
Florida Two-Year College Mathematics Association

Saint Leo University
February 26 - 27, 2016
Florida Section of the Mathematical Association of America

2015 – 2016

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Florida Two-Year College Mathematics Association

2015-2016

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Sandra Seifert, Florida SouthWestern State College
Sandra Seifert, Florida SouthWestern State College
Altay Özgener, State College of Florida
Altay Özgener, State College of Florida
PROGRAM

Friday, February 26, 2016

Committee Meetings and Workshops

FL - MAA

9:00 - 10:30 Executive Committee Meeting
Kirk Hall 303

FTYCMA

9:00 - 9:50 FTYCMA Officer's Meeting
SAB 117

10:00 - 11:30 FTYCMA Annual Business Meeting
SAB 117

11:30 - 1:30 New Members Luncheon and Mingle
Boardrooms

Free lunch for first time attendees. This luncheon is our opening mingle to welcome new members and provide an opportunity to network with members from all over Florida. Pre-registration was required.

REGISTRATION

10:30 - Registration & Publishers
Kirk Hall 123

Sign in and browse the displays from several publishing representatives.

WELCOME

1:45 - 2:00 Welcoming Remarks
Boardrooms

Dr. William Lennox, President of Saint Leo University
Siamack Bondari, Chair of Mathematics and Science Department of Saint Leo University
Ryan Kasha, President, FTYCMA
Joni Pirnot, President, FL-MAA
Friday, February 26, 2016

2:00 – 2:50  Plenary Session  Boardrooms

Francis Su – President, Mathematical Association of America

Voting in Agreeable Societies

3:00 – 3:45  Contributed Papers Session I

Rachel Rohan – FAU H.L. Wilkes Honors College  Kirk Hall 122

Analysis and Regression of Billboard’s Hit Songs: popularity, longevity, and repetition

Chastity Jhingree – FAU H.L. Wilkes Honors College  Kirk Hall 122

Numerical Analysis and Applications

Kathryn Schrumpf and Mark Linton – Cengage Learning  Kirk Hall 124

Change the Game with MindTap Next-Gen Technology

Carol Warner – Barry University  Kirk Hall 222

Multi Purpose Math MOOCing

Kathleen Miller – Retired Educator  Kirk Hall 222

Mentoring for Success

Joy D’Andrea – University of South Florida, Sarasota-Manatee  Kirk Hall 224

A Statistical Analysis of Sinkholes in Florida

Taylor Brett – Lake Sumter State college  Kirk Hall 329

The Golden Triangles

Samantha Kern and Hope Swaim – Saint Leo University  Lewis Hall 131

Facilitating a Robotics Camp (from a counselor’s perspective)

Jonathan Guy – University of West Florida  Lewis Hall 131

The Squeeze Theorem: The Behavior of Functions
Contributed Papers Session II

Colleen Sanders - Harriet L. Wilkes Honors College of Florida Atlantic University
Kirk Hall 122

*The Mathematics behind Hurricane Prediction*

Joanna L. Quan Soon - Embry-Riddle Aeronautical University
Kirk Hall 122

*Study of time evolution of the order in a pile of objects by random and biased selection and replacement*

C. Clinton Harschaw - Presbyterian College, Clay E. Harshaw
and Emily Rhodes - Winston-Salem State University
Kirk Hall 124

*Measuring Within-Season and Between-Season Competitive Balance in Drag Racing*

Dennis C. Runde - State College of Florida
Kirk Hall 222

*Teacher Lounge Banter: Ten (or more) Intriguing Questions from an Experienced Math Teacher*

Patrick Bibby - University of Miami
Kirk Hall 224

*An Introduction to the Symmetric Derivative*

Timothy W. Jones - FSW Collier Campus
Kirk Hall 329

*A Self-Contained Algebra Only Proof that Pi is irrational*

Shawn Harrell - University of West Florida
Lewis Hall 131

*Towards an Affine Hook-Length Formula*

Djhenne Dalmacy - University of West Florida
Lewis Hall 131

*Factors Affecting Depression in Adults: Analysis from a Survey*
3:30 - 7:00  

**Student Events**

**Student Integration Contest**
Come test your integration abilities!

**Student Math Puzzle Contest**
Attempt to solve our Sudoku and Paint-doku puzzles.

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

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### Workshops

**3:00 - 4:45**

Debbie Garrison and Jolene Rhodes - Valencia College

**Kinesthetic Algebra**

Tired of those glassy-eyed stares in Algebra class? Get your students up and moving while they learn. This workshop will let you try classroom ready activities that have students walking, throwing, mixing, posing, cutting and pasting, flipping their way through the concepts of Algebra.

**5:30 - 6:15**

C. Altay Özgener - State College of Florida  
Robert Shollar - State College of Florida  
Emre Özgener - University of Florida

**LaTeX, Basic Packages, and (Beamer, Book, Article) PGF/TikZ**

We will introduce the basics of LaTeX, and use of some packages. We will also introduce some graphing programs within LaTeX such as PGF/TikZ, Asymptote, and/or PS-Tricks.

**4:45 - 5:30**

**Conference Break**

Please visit the textbook publishers in Kirk Hall 123.

**4:45 - 5:30**

**Governor’s Session**

Jacci White, Saint Leo University

*What can the MAA do for you and what can you do for the MAA?*
**Contributed Papers Session III**

Patrick Serafin - Embry-Riddle Aeronautical University  
*Kirk Hall 122*  
*Classical, relativistic and quantum collisional particle accelerator*

Pedro E. Silhy - Embry-Riddle Aeronautical University  
*Kirk Hall 122*  
*Mathematical model for an autonomous energy harvesting system from shallow water waves*

Mike Keller - St. Johns River State College  
*Kirk Hall 124*  
*What percent of M&M's are blue?*

Lisa O. Coulter - Stetson University  
*Kirk Hall 222*  
*Mathematics and Assessment: Tales from the Trenches*

Sharmistha Chakrabarti, Frederique Drullion and Jayathi Raghavan -  
Embry-Riddle Aeronautical University  
*Kirk Hall 222*  
*Cross-collaboration, Peer Mentoring and Longitudinal Learning Among Honors Students Taking Sequential Mathematics Courses*

Robert M. Shollar - State College of Florida  
*Kirk Hall 224*  
*Invitation to Fractional Calculus*

Michael Reynolds - Indian River State College  
*Kirk Hall 329*  
*Russian Multiplication*

Josaphat (Jossy) Uvah - University of West Florida  
*Lewis Hall 131*  
*An Intervention for Improving Performance in General Education Mathematics*

**6:30 - 8:30**  
*Conference Banquet and Awards Ceremony*
A friend and our surprise Guest - You won’t want to miss this!

A lot has happened since 1979...Looking for a pattern that ties the following seven items together: The Golden Ratio, Proofs, Car Talk, Grandchildren, Cooperative Learning, Weddings, and the Grand Canyon.

10:00 - 10:45 Contributed Papers Session IV

Chindu Mohanakumar - University of Florida
Kirk Hall 122

*Mathematical Model for Time to Neuronal Apoptosis Due to Accrual of DNA DSBs*

Jennifer Kindle and Thanos Gentimis - Florida Polytechnic University Kirk Hall 122

*Florida Poly Primers: Calculus*

Lukas Nabergall - University of South Florida Kirk Hall 124

*Patterns and Distances for Double Occurrence Words*

Gregory McColm - University of South Florida - Tampa Kirk Hall 124

*Geometry, Art & Illusion*

Don Ransford - Florida SouthWestern State College Kirk Hall 219

*Helpful Data in Determining the Success/Failure of SB 1720*

Carrie E. A. Grant - Flagler College Kirk Hall 222

*A Perfect Final Project Design*

Warren McGovern - Florida Atlantic University Kirk Hall 224

*Elements to look for in Commutative rings*

Bret Taylor - Lake-Sumter State College Kirk Hall 329

*Pascal’s Triangle and the Fibonacci Sequence*

Brian Camp and Kevin Murphy - Saint Leo University Lewis Hall 131

*Manipulate and Interact: A Hands-on Mathematica and Sage Tutorial*
Contributed Papers Session V

Naimul Chowdhury - New College of Florida

*Japanese Language as a Set Theory Construct*

Colin Defant - University of Florida

*The Stack-Sorting Algorithm*

Yuanchang Sun - Florida International University

*Computational Modeling of Data Fitting with Nonlinear Distortions*

Jacqueline Hine - Keiser University and
Wendy Pogoda - Hillsborough Community College

*Note Taking Tips for Beginning Math Students*

John Coney - Coney Mathematics, Political Economy and Logic

*MEST not STEM and*

*I nominate myself for the 2016 Nobel Prize in Economics*

Jay Lehmann - College of San Mateo

*Teaching a Prestatistics Course: Propelling Non-STEM Students Forward*

Lubomir Markov - Barry University

*Some Remarks on Flett’s Theorem*

TaeEun Kim - Southeastern University

*Measuring the intensity of tornados*

Frederic Zerla - University of South Florida

*The Mathematics of Moorish Spain Seeps into Western Europe*

Chuck Lindsey - Florida Gulf Coast University

*The Nepohualtzintzin: a Closer Examination*

Katie Bakewell and Sudam Surasinghe - University of North Florida

*Analysis of Thickened Graphs*

Ben Webster and Katie Bakewell - University of North Florida

*A Language Theoretic Approach to Biased Walks*
Workshops

10:00 – 11:00  C. Altay Özgener - State College of Florida
               Robert Shollar - State College of Florida
               Emre Özgener - University of Florida
               Naimul Chowdhury - New College of Florida

LaTeX, Basic Packages, and (Beamer, Book, Article) PGF/TikZ

We will introduce the basics of LaTeX, and use of some packages. We will also introduce some graphing programs within LaTeX such as PGF/TikZ, Asymptote, and/or PS-Tricks.

11:15 – 12:00  C. Altay Özgener and Jim Condor - State College of Florida

A Super Application

We will talk about how mathematics can be used to obtain many complex shapes and curves that are found in nature and in gaming.

9:00 – 12:00  Monika Kiss - Saint Leo University

Girls Can! Robotics Camp - a sneak peak

We will have a small group of young ladies who participated in the first Ever Girls Can! Robotics Camp in the summer of 2015 work on robots and programming them. You will be able to come and visit during the three hour block and observe what the girls can do.

12:00 – 1:00  Plenary Session

Brandy Wiegers - Associate Director and Assessment Specialist of the National Association of Math Circles

Growing problem solving skills through Math Circles

Closing Remarks

Ryan Kasha, President, FTYCMA
Joni Pirnot, President, FL-MAA

1:15 – 3:00  Luncheon and FL-MAA Business Meeting
ABSTRACTS

Contributed Papers Session I

Rachel Rohan - FAU H.L. Wilkes Honors College

Analysis and Regression of Billboard’s Hit Songs: popularity, longevity, and repetition

Hit songs overplayed on the radio, advertised on every YouTube video, and stuck in your head all day? Over the past 7 years, there have been hundreds of top ten songs, and almost 100 #1 songs according to Billboard. To musicians and mathematicians alike, many of these successful songs seem redundant, both unto themselves and to each other. Through data collection, musical analysis, and statistical analysis, I seek for reoccurring patterns in chorus chord progression, structural movement, key signatures, and more in #1 songs to discover pieces of a hit song “algorithm”. I will also share correlation analysis of peak Billboard position and number of weeks on the charts.

Chastity Jhingree - FAU H.L. Wilkes Honors College

Numerical Analysis and Applications

The scientific calculator boasts as a technological achievement, but ironically has led to a state of helpless dependency. In fact, the human mind is left to do little as the scientific calculator spits out every possible answer to a matrix or trigonometric problem or any mathematical feed. Uncovering the secrets behind the calculation of algebraic and transcendental equations would mean a stringent observation and application of the Newton and Cordic Methods, thus eliminating the dependency on technology - the calculator - and placing a greater reliance on the human mind. Basically, the premise of my presentation is to demonstrate that one does not need to input information into a calculator to solve and retrieve an answer, but instead explores and uses alternative ways to achieve identical or even the same results. The TI-83/84 and TI 89 can produce Newton's Method; however, Newton's Method can also provide fast numerical approximations because of its iterative process where the guessing of a real-valued function brings all the guesses closer to the desired point, thus making the method a convergence of all the guesses. The Cordic method may be considered a variation to the Newton Method because common to both is the idea of the iterative, the process of moving one guess, xn to another xn+1. Therefore, it may be a more exciting mathematical venture to use the Newton and Cordic Methods in calculating algebraic and transcendental equations instead of denying one's self of this matrix joy by totally using the calculator to solve everything.

Carol Warner - Barry University

Multi Purpose Math MOOCing

For true educators, broadening the access to college math education is more important than making money for your university. But, Dr. Carol Warner at Barry University has implemented a free, non-credit Math MOOC designed to do both - plus more. Her Mathematical Foundations MOOC is designed to lower the cost of a college degree, allow world-wide free access for learners, serve as the school's math placement exam for new students, and to generate interest in the school's fully-accredited online programs.
Joy D’Andrea - University of South Florida, Sarasota-Manatee

A Statistical Analysis of Sinkholes in Florida

Sinkholes are common among Florida's landscape. In this talk we will discuss the relationship between length and width which characterizes the diameter of a sinkhole. Our analysis includes both parametric and non-parametric methods including correlation analysis and simple linear regression to verify the similarity in the distributions of length and width. Further analysis includes logistic regression to estimate the probability of a given soil type as a function of the measured dimensions of a sinkhole.

Taylor Bret - Lake Sumter State College

The Golden Triangles

A look at the two Golden Triangles (isosceles triangles whose sides are in the golden ratio). Some surprising outcomes where golden ratios appear. Construct the two triangles from the Golden Rectangle, determine the angles of each, the areas of each and then let the fun begin!

Kathryn Schrumpf and Mark Linton - Cengage Learning

Change the Game with MindTap Next-Gen Technology

Today’s math students are different. Their needs and realities are not the same as in the past. So, why is it we continue using digital solutions from the past and expect improved results?

Attend this eye-opening session to learn about the extensive research used to build MindTap integrating advancements in next-gen technology to change the game for students’ success. Unlike any other math program, MindTap incorporates innovate features designed through student feedback to help students improve engagement, persist through their challenges, increase their retention, learn to transfer new skills, and actually have fun learning math! MindTap for Math -- Advancing Learning, One Student at a Time.

Kathleen Miller - Retired Educator

Mentoring for Success

The outlook for jobs in STEM fields is strong, yet we are experiencing a shortage of college graduates who are prepared to participate. Mentoring can be a successful strategy for increasing the number of college graduates and workers in STEM fields, especially women and underrepresented minorities. Potentially one of the biggest motivating factors is role models and mentors who help students feel connected and engaged, which can ultimately improve student outcomes. Mentors can also help students visualize themselves in successful STEM careers. Many people in STEM fields credit mentors for helping them to choose fields of study and achieve career success, and this is true for me personally.

Key topics of the talk will include:

- Definition of formal / informal mentoring
- Review of research on mentoring: impact on college-going experiences
- Tips for successful faculty - student mentoring relationships
- Resources for establishing a mentoring culture
**Samantha Kern and Hope Swaim** - Saint Leo University

*Facilitating a Robotics Camp (from a counselor's perspective)*

Dr. Monika Kiss, Associate Professor of Mathematics at Saint Leo University, constructed a female only robotics camp and held three one week long sessions in the summer of 2015. The program also was aided by undergraduate students at Saint Leo University serving as camp counselors. This session will present the camp's benefits and experience from the counselor's perspective.

**Jonathan Guy** - University of West Florida

*The Squeeze Theorem: The Behavior of Functions*

In this talk I will be explaining and expanding on Squeeze Theorem, and Pinching Theorem, as it's applied to bottle necking events and conditions, or as I like to call it Bottle Neck Point Squeeze Theorem. Which just means that we are looking at two lines, curves, or even real structures, that almost meet and we can use Squeeze Theorem the discuss the behavior of something that passes through them. So I will writing some new limit rule for this because I'm changing from Squeeze Theorem or Pinching Theorem to this newer expansion the limit aren't approving the same number anymore, with respect to some small error value so it's still a type of Squeeze Theorem. What more can Squeeze Theorem tell us?

**Contributed Papers Session II**

**Colleen Sanders** - Harriet L. Wilkes Honors College of Florida Atlantic University

*The Mathematics behind Hurricane Prediction*

I will be discussing the ways in which mathematics is used in the process of hurricane prediction. The presentation will discuss some of the methods of calculation as well as the recent changes in meteorology in order to find more effective methods of predicting hurricanes. The methods discussed will include the use of statistics in the generation of trends, and in the calculation of Accumulated Cyclonic Energy (ACE), as well as a discussion of the use of Markov chains in respect to property damage. These methods help meteorologists predict storm frequency, strength, and projected damages. The presentation will provide methods of calculation as well as a discussion of current projects and papers in this area of study.

**Joanna L. Quan Soon** - Embry-Riddle Aeronautical University

*Study of time evolution of the order in a pile of objects by random and biased selection and replacement*

We study the statistical evolution of a stack of objects, each one having a certain distinct probability of being selected at every drawing. Supposing every time one object is selected will be according to this given probability distribution function, and after selection and inspection the object will be placed on the top of the pile, we evaluate what is the estimated order of the objects in the pile after a given number of drawings.

**Dennis C. Runde** - State College of Florida

*Teacher Lounge Banter: Ten (or more) Intriguing Questions from an Experienced Math Teacher*

What are your thoughts on "FOIL"? Should we teach the "ac method"? Does "is over of" really work? Should students memorize the sequence and series formulas? Should we provide notes to our students? What are your thoughts on review sheets? These are a few of the questions that this talk will pose to the participants. Although the presenter will share opinions, participants will also be strongly encouraged to disagree and make their cases as
well. Caution: The discussion started during this session may carry over to lunch, dinner, and other social time spent with math teachers!

Patrick Bibby – University of Miami

An Introduction to the Symmetric Derivative

The symmetric derivative of a function will be defined and compared to the (ordinary) derivative. It will be shown that the symmetric derivative always exists wherever the derivative exists and may exist even if the derivative does not. It will be shown that the symmetric derivative may exist at a removable discontinuity or an infinite discontinuity, but never at a jump discontinuity. It will also be shown that the symmetric derivative may exist at a cusp of a continuous piecewise function.

Timothy W. Jones – FSW Collier Campus

A Self-Contained Algebra Only Proof that Pi is irrational

In this presentation I will use the latest transcendental techniques to prove pi is irrational. Only derivatives of polynomials are used – these can be defined without limits. The proof makes use of complex numbers, but only at the most elementary level. Attendees will be given ten problems that sophisticated calculus students should be able to solve. The problems (with their solutions) fill in all the details to make the proof largely self-contained.

C. Clinton Harschaw – Presbyterian College, Clay E. Harshaw and Emily Rhodes – Winston-Salem State University

Measuring Within-Season and Between-Season Competitive Balance in Drag Racing

Competitive balance is important to all sanctioning bodies of sport, to develop fan interest and support. The National Hot Rod Association (NHRA) is the largest motorsports sanctioning body in the world. The NHRA has four professional classes: Pro Stock Motorcycle (PSM), Pro Stock (PS), Funny Car (FC), and Top Fuel (TF). This study investigates the competitive balance effects of changes to the 2013 rules package in the NHRA’s Pro Stock Motorcycle category. These competitive balance effects are measured in two ways: within-season balance using the Adjusted Churn index, and between-season balance by using a measure of economic balance, the Gini coefficient. We used the bootstrapping approach to arrive at confidence intervals for the Gini coefficient under the same rules packages, to better predict the level of competitive balance from season to season.

Kathleen Miller – Retired Educator

Mentoring for Success

The outlook for jobs in STEM fields is strong, yet we are experiencing a shortage of college graduates who are prepared to participate. Mentoring can be a successful strategy for increasing the number of college graduates and workers in STEM fields, especially women and underrepresented minorities. Potentially one of the biggest motivating factors is role models and mentors who help students feel connected and engaged, which can ultimately improve student outcomes. Mentors can also help students visualize themselves in successful STEM careers. Many people in STEM fields credit mentors for helping them to choose fields of study and achieve career success, and this is true for me personally.

Key topics of the talk will include:
  - Definition of formal / informal mentoring
- Review of research on mentoring: impact on college-going experiences
- Tips for successful faculty - student mentoring relationships
- Resources for establishing a mentoring culture

**Shawn Harrell - University of West Florida**

**Towards an Affine Hook-Length Formula**

The famous Hook-Length Formula of J. S. Frame, G. de B. Robison, R. M. Thrall counts the number of standard tableaux of a given partition shape. This formula has applications to many areas of mathematics such as representation theory, algebraic combinatorics and enumerative combinatorics. Our work looks to generalize this formula by considering a generalization of the standard tableau. For a given positive integer $k$, we consider the standard $k$-tableaux introduced by L. Lapointe, L. Lascoux and J. Morse. For a fixed partition shape, we formulate the number of standard $k$-tableaux of that shape. Through this formulation, we conjecture the number of standard $k$-tableaux of other partition shapes.

**Djhenne Dalmacy - University of West Florida**

**Factors Affecting Depression in Adults: Analysis from a Survey**

Depression has been a major risk factor for suicide and certain serious illnesses for a very long time. Several factors such as socioeconomic, sleeping time, alcohol intake have been used in the past to study the risk of being diagnosed with depression. In this study, we will use Logistic regression to study the risk factors for depression, as well as Structural equation modeling to study the relationship between these factors with respect to depression.

**Contributed Papers Session III**

**Patrick Serafin - Embry-Riddle Aeronautical University**

**Classical, relativistic and quantum collisional particle accelerator**

We study the 1-dimensional collision of a point like light particle between two super-heavy masses converging towards one central point. The collision are considered elastic, plastic or by using various models of potential interactions. The light mass inside is accelerated to very high velocities by successive collisions from the compression system. We study the time evolution of these three body system, efficiency of this acceleration, and escape possibilities for classical mechanical, relativistic and quantum non-relativistic cases. Application from acoustic waves to adiabatic compression and heavy ion collisions of anti-matter are considered.

**Pedro E. Silhy - Embry-Riddle Aeronautical University**

**Mathematical model for an autonomous energy harvesting system from shallow water waves**

The water waves in the benthic area of lagoons have typical parameters of shallow water waves occurring in the region between the shore and bodies of water isolated by barrier islands or reefs. This mechanical system is designed to float independently and to receive kinetic and potential energy from the waves and to convert it to mechanical energy by using a paddle and ratchet system. Our model examines mathematically the efficiency of conversion of the energy by optimizing the average momentum transfer from the waves run up on the paddles by using a statistical power distribution of the waves in the Indian River lagoon system.
Lisa O. Coulter - Stetson University

Mathematics and Assessment: Tales from the Trenches

Stetson is a comprehensive university with three schools and an undergraduate enrollment of approximately 3000 students. All students are required to take a course in quantitative reasoning, and these are taught across a variety of disciplines. We discuss assessment results from students in these classes, and compare them to results obtained from the nationally normed CLA. We also indicate how we are attempting to “close the loop” using the results of these assessments. We also discuss results of assessment of students in the Mathematics major. We have a number of program level outcomes which we are assessing on an ongoing basis, with each outcome assessed approximately every three to four years. Results of these assessments will be discussed, along with how they have informed our curriculum in the major.

Sharmistha Chakrabarti, Frederique Drullion and Jayathi Raghavan - Embry-Riddle Aeronautical University

Cross-collaboration, Peer Mentoring and Longitudinal Learning Among Honors Students Taking Sequential Mathematics Courses

The main purpose of this study was to improve retention of information through nonconsecutive mathematics classes. Because of scheduling of the authors’ classes, our student sample group was taken among the Honor students, which led us to add a secondary goal: the retention in the Honors Program. To achieve these objectives the authors conducted a collaborative project where two of the authors taught Honors multivariable calculus and the third taught Honors advanced calculus. Students in advanced calculus developed their leadership and communication skills and reconnected with material needed for their current projects by tutoring the multivariable calculus students during in-class practice sessions and giving presentations about the application of vector calculus, several times throughout the semester. Knowing the application of the material in future classes motivated the multivariable calculus students to learn and retain material. The success of our study was assessed through student survey and grade comparison.

Robert M. Shollar - State College of Florida

Invitation to Fractional Calculus

In a standard calculus course we learn about the concept of a first derivative, second derivative, and so on as well as the concept of an anti-derivative. However, few are fortunate enough to be aware of the concept of a fractional derivative. What is the half derivative of a function? More generally, what is the $n^{th}$ derivative of a function where $n$ is not restricted to be an integer? Gottfried Leibniz and Guillaume de l’Hôpital first pondered this question many centuries ago. In this talk we will briefly explore the deep history and the rich theory of the differentiation operator and the integration operator in a less restrictive sense.

Michael Reynolds - Indian River State College

Russian Multiplication

‘Russian Multiplication’ is an alternative to the standard multiplication algorithm that has enjoyed its share of attention in the literature. The talk will demonstrate the process, discuss its origins (which go back several thousand years), and examine its foundation in binary arithmetic. This talk is accessible to a wide audience, and the information presented could be adapted into both college and high school classes.
Mike Keller - St. Johns River State College

What percent of M&M's are blue?

Participants will use M&M's to construct confidence intervals to estimate the percent that are blue (or your favorite color). Participants will also test claims made by the manufacturer.

Josaphat (Jossy) Uvah - University of West Florida

An Intervention for Improving Performance in General Education Mathematics

We discuss the design, implementation, and assessment of students’ performance in Gen-Ed mathematics courses. We use our good results for Calculus 2 to proffer a platform that can be adapted throughout Gen-Ed mathematics.

Contributed Papers Session IV

Chindu Mohanakumar - University of Florida

Mathematical Model for Time to Neuronal Apoptosis Due to Accrual of DNA DSBs

We propose a mechanism to explain neuronal aging by tracking the number of non-transient DNA double-strand breaks (DSBs) and repairs over time that may lead to apoptosis. Neuronal apoptosis depends on the amount of space between DSBs as well as time. We derive three models to track the effect of neurodegeneration: a system of autonomous Ordinary Differential Equations (ODEs), a probability model to track the spatial requirement, and a stochastic model that incorporates both the ODE temporal dynamics and a spatial probability model. Using these models, we estimate a distribution for the lifespan of a neuron and explore the effect of parameters on time to death. We identify three possible causes of premature neuronal apoptosis: problems with coding critical repair proteins, issues with the neuron detecting DSBs, and issues with the neuron responding to DSBs.

Jennifer Kindle and Thanos Gentimis - Florida Polytechnic University

Florida Poly Primers: Calculus

At Florida Polytechnic University, a STEM University founded in 2014, Calculus I is the first math course required by students in every major. Unfortunately, many students are unprepared due to lack of necessary prerequisites or a time gap in their schooling. In order to ensure students received the support necessary for the rigorous work of Calculus I, an online Primer course was developed. The course, which is housed in the online platform CANVAS, targets specific topics and skills necessary for students to achieve success in Calculus I. In this paper, we present the effect of the primer on the retention rate for Calculus I, on pass rate, and on average grade received.

Lukas Nabergall - University of South Florida

Patterns and Distances for Double Occurrence Words

We study the frequent occurrences of repeated and palindromic sequences corresponding to rearrangement observed in genomes of certain ciliate species. We represent the order and orientation of these rearrangements by double occurrence words (DOW), words where every symbol appears exactly twice. This has motivated the definition and study of pattern indices, the minimum count of the nested appearances of repeated, palindromic words, and other specified patterns. Furthermore, we define a word distance between two words using the pattern index. We then present results on these general pattern indices and word distances. We applied the pattern index
to analyze 22 highly scrambled genetic sequences and showed that the distance of the corresponding DOWs from a newly discovered pattern is less than the average distance of a random sample.

Gregory McColm - University of South Florida

Geometry, Art & Illusion

Centuries and even millennia before photography (and computer graphics), artists employed tricks and even gadgets to create realistic art. And not just deliberately realistic art. Sometimes they produced art that only looks real, or looks more real than the real thing, or even looks more desirable (er, ideal) than the real thing. Artists have used many tools and techniques for replicating, simulating, enhancing, and ... improving upon ... reality, and we take a brief look at some of the geometric gizmos behind producing art as real as, or even better than, the real thing.

Carrie E. A. Grant - Flagler College

A Perfect Final Project Design

The purpose of this presentation is to propose a method on how to effectively design a final project for an introductory statistics course. This project design involves selecting a topic that faces students on campus, making a prediction in regards to the issue, designing a survey to gather data, analyzing the data descriptively, and then using the data to test predictions regarding the population as a whole. The issues selected must involve a topic that all students on campus can have an opinion on. Two predictions must be made prior to gathering data; one prediction in regards to the overall opinion of the population and one prediction about how groups in the population may respond differently. Since the results of their work is shared amongst other departments on campus, students find pride in their project and realize that they may help to make a positive change on campus.

Warren McGovern - Florida Atlantic University

Elements to look for in Commutative rings

In a typical Modern/Abstract Algebra course, students encounter different types of elements in rings: units, zero-divisors, regular elements, idempotents, nilpotents, irreducible, and prime elements. In this talk we will discuss some new types of elements that can be found in the recent literature and combinations of them that lead to interesting classes of commutative rings with identity.

Bret Taylor - Lake-Sumter State College

Pascal’s Triangle and the Fibonacci Sequence

Many of us have probably seen where the Fibonacci Sequence can be found in Pascal’s Triangle. But, do we know what each number in the diagonals that give us the sequence represent? And, what do they have to do with rabbits? What if Pascal had been asked, “In August, how many grandchildren will the original pair of rabbits have?” Conclude with developing a non-recursive formula for the Fibonacci sequence base on combinations.

Don Ransford - Florida SouthWestern State College

Helpful Data in Determining the Success/Failure of SB 1720

As a follow-up to the 2015 FTYCMA Fall Retreat and in preparation for the 2016 FTYCMA Fall Retreat, session participants will be asked to share their thoughts on how best to measure the positive and negative effects of Florida Senate Bill 1720. Those of us who have classroom experience and day to day contact with students very likely have our own anecdotal views of how self-placement and a faster pace of instruction will affect the success
of students in mathematics courses. However, Fall Retreat attendees felt that it would be in our best interest to gather quantitative and qualitative evidence from colleges state-wide in a unified effort to defend our position on the subject.

Brian Camp and Kevin Murphy – Saint Leo University

Manipulate and Interact: A Hands-on Mathematica and Sage Tutorial

Come and explore interactive cells that can be produced by both Mathematica and Sage. This will be an effort to showcase what can be done with one of the leading mathematical software packages and one of its main open-source competitors. Familiarity with either is not assumed. Some simple examples will be built in a workshop fashion and some more complicated examples will also be demonstrated. This will be in a workshop format so seating is limited to the first twenty or so that show up.

Contributed Papers Session V

Naimul Chowdhury – New College of Florida

Japanese Language as a Set Theory Construct

In this presentation I will discuss the potential for Japanese language to be constructed with sets and subsets of words. The high regularity of Japanese allows for the language to be treated mathematically. I will specifically talk about verb tenses, and describe an easily defined set of functions that allows someone with no knowledge of Japanese to transform the word into formal present, past, and future tense.

Colin Defant – University of Florida

The Stack-Sorting Algorithm

In his Ph. D. thesis, Julian West studied a map $s$, known as the stack-sorting algorithm, that sends permutations to permutations by sending an input permutation through a vertical stack. Let $W_t(n)$ denote the number of permutations $\pi \in S_n$ such that $s^t(\pi) = 123 \cdots n$. In this talk, I will present a brief summary of the history of the stack-sorting algorithm and the investigation of the numbers $W_t(n)$. I will then present some of my recent results in this area. In particular, I will provide significant improvements of the best known upper bounds for $\limsup_{n \to \infty} \sqrt[n]{W_t(n)}$ when $t = 3$ and $t = 4$.

Yuanchang Sun – Florida International University

Computational Modeling of Data Fitting with Nonlinear Distortions

Substances such as chemical compounds are invisible to human eyes, they are usually captured by sensing equipment with their spectral fingerprints. Though spectra of pure chemicals can be identified by visual inspection, the spectra of their mixtures take a variety of complicated forms. Given the knowledge of spectral references of the constituent chemicals, the task of data fitting is to retrieve their weights, and this usually can be obtained by solving a least squares problem. Complications occur if the basis functions (reference spectra) may not be used directly to best fit the data. In fact, random distortions (spectral variability) such as shifting, compression, and expansion have been observed in some source spectra when the underlying substances are mixed. In this talk, we formulate mathematical model for such nonlinear effects and build them into data fitting algorithms. If minimal knowledge of the distortions is available, a deterministic approach termed {\it augmented least squares} is developed and it fits the spectral references along with their derivatives to the mixtures. If the distribution of
the distortions is known a priori, we consider to solve the problem with maximum likelihood estimators which incorporate the shifts into the variance matrix. The proposed methods are substantiated with numerical examples including data from Raman spectroscopy (RS), nuclear magnetic resonance (NMR), and differential optical absorption spectroscopy (DOAS) and show satisfactory results.

Jacqueline Hine - Keiser University and Wendy Pogoda - Hillsborough Community College

Note Taking Tips for Beginning Math Students

This presentation will demonstrate some innovative note taking strategies. These strategies, when used effectively, increase student learning outcomes and encourage higher order thinking skills in early college math courses. Topics to be presented will include note taking annotations, instant graph paper, notebook organization, outlining a lesson, restating definitions, and numerous other techniques. These techniques, when used consistently and appropriately, will not only foster student comprehension but will lead them toward applied curriculum mastery.

John Coney - Coney Mathematics, Political Economy and Logic

MEST not STEM

Our educational priorities should be MEST (in that order!), not STEM (in that order?)
STEM = Science, Technology, Engineering, Mathematics.
MEST = Mathematics, Epistemology, Science, Technology.

John Coney - Coney Mathematics, Political Economy and Logic

I nominate myself for the 2016 Nobel Prize in Economics

Why do we allow the 1% to create money in order to lend to the government? Do we really need to have 2% inflation in order to have 4% growth? What is wrong with 0% inflation with 2% growth?
Death to the sovereign debt markets! In the future, money will be created by the president signing in red, so that we may create money by signing in black, blue or green.

Lubomir Markov - Barry University

Some Remarks on Flett’s Theorem

In 1958, T. M. Flett published an interesting mean value theorem which now bears his name. The purpose of this talk is to examine several related results that are believed to be new.

TaeEun Kim - Southeastern University

Measuring the intensity of tornados

Introducing a new way of measuring the intensity of a tornado, we can now forecast when and where it will form, along with how long it will exist.

Jay Lehmann - College of San Mateo

Teaching a Prestatistics Course: Propelling Non-STEM Students Forward

Many colleges are propelling non-STEM students through math programs by creating a path-to-stats course, which can be taken in place of elementary and intermediate algebra. Innovative use of density histograms, challenging
data-centered exercises, and interpretation of statistical concepts can greatly enhance students' understanding and eventual success in a statistics course.

Frederic Zerla – University of South Florida

The Mathematics of Moorish Spain Seeps into Western Europe

The Islamic culture of Spain in the Tenth Century was far superior to anything in Western Europe. We concentrate on some of the people who bridged the gap to bring Arabic mathematics into Western Europe.

Chuck Lindsey - Florida Gulf Coast University

The Nepohualtzintzin: a Closer Examination

Nepohualtzintzin is an abacus-like counting and calculating device, whose name is derived from a phrase in the Nahuatl language. It is widely stated and accepted that the Nepohualtzintzin was in use by the Aztecs and related indigenous groups in parts of Mexico and Central America for many years, perhaps centuries, before the arrival of the Spanish in the early 16th century. We will look at the contemporary claims for pre-Columbian invention and use of this device, attempt to trace their origin, and examine the evidentiary basis for those claims.

Katie Bakewell and Sudam Surasinghe - University of North Florida

Analysis of Thickened Graphs

For a given graph, $G$, a thickened graph can be constructed by converting each edge to an edge ribbon. This thickened graph is a locally two dimensional topological space. However, other thickened graphs representing $G$ exist through elementary boundary operations at one or more of the vertices of $G$. We examine the boundary components of these families of thickened graphs. Applications of the properties of thickened graphs in solving graph theoretic problems using self-assembly of DNA molecules will be discussed.

Ben Webster and Katie Bakewell - University of North Florida

A Language Theoretic Approach to Biased Walks

For random walks on graphs, theorems regarding expected value are readily available. Using Markov Chain properties, the expected number of steps to a particular state, and in the finite case, the expected number of steps to cover the graph are easily calculated. However, when considering a biased walk on a graph, a task as simple as constructing the sample space becomes difficult. We consider the use of language theory in assisting in such problems. We construct a grammar for a small graph.
Francis Edward Su – President, Mathematical Association of America, Harvey Mudd College
Benediktsson-Karwa Professor of Mathematics

Bio: Francis Edward Su is the Benediktsson-Karwa Professor of Mathematics at Harvey Mudd College. He received his B.S. in Mathematics from the University of Texas at Austin and his Ph.D. from Harvard University. He is currently President of the Mathematical Association of America. His research is in geometric combinatorics and applications to the social sciences, and he has co-authored numerous papers with undergraduates. He also has a passion for teaching and popularizing mathematics. From the Mathematical Association of America, he received the 2001 Hasse Prize for expository writing, and the 2004 Alder Award and the 2013 Haimo Award for distinguished teaching. He authors the popular Math Fun Facts website and iPhone app. His hobbies include songwriting, gardening, photography, and theology. Just like mathematics, these are modes of creative expression that divinely blend structure and freedom, truth and beauty, reflection and action.

Voting in Agreeable Societies

When does a majority exist? How does the geometry of the political spectrum influence the outcome? What does mathematics have to say about how people behave? When mathematical objects have a social interpretation, the associated results have social applications. We will show how some classical mathematics about the geometry of convex sets and their intersections can be used to model people’s preferences and understand voting in "agreeable" societies. This talk also features research with undergraduates.

A Friend and Surprise Guest Speaker

Bio: Our guest is currently Vice President of Strategic Initiatives at SCF. He joined what was Manatee Junior College as an Instructor in Mathematics. Since that time, the College name has changed and he has held various roles over the years: Professor of Mathematics (teaching for over 30 years), Department Chair, Division Director, Dean of Instruction, and Vice President of Baccalaureate Programs/Provost of SCF Bradenton, until moving into his current role in 2014.
A rare native of Florida, he was born and raised in St. Petersburg. He graduated from St. Petersburg Junior College with an A.A. degree, then from Florida State University with a B.S. degree, and University of Kentucky with a M.S. degree in Mathematics. After being at the MJC/MCC for ten years, he commuted to the University of South Florida in Tampa and completed his Ph. D. in Higher Education/Mathematics Education over a six year period as a part-time student.
He has served in a variety of leadership positions with the Florida Two-Year College Mathematics Association and the Florida Section of the Mathematical Association of America, serving most recently as Governor of the Florida Section. Numbers are an important part of his life, including his one beautiful wife (Kathy), their five children, their seven incredibly good-looking grandchildren, and the seven marriage ceremonies for which he has officiated.

A lot has happened since 1979…Looking for a pattern that ties the following seven items together: The Golden Ratio, Proofs, Car Talk, Grandchildren, Cooperative Learning, Weddings, and the Grand Canyon.

The talk has a prime number (greater than 2, smaller than 41) of distinct parts, among which will be many of the items mentioned in the title. This session is “math light” and understandable by most anyone (though University of Florida graduates may have to really focus). Hoping this is a break from the weight of the world, know that audience participation will be encouraged (and probably needed). Prizes will be given.
Brandy Wiegers - Assistant Professor of Mathematics Central Washington University
Associate Director and Assessment Specialist of the National Association of Math Circles

**Bio:** Dr. Wiegers is currently the Associate Director and Assessment Specialist of the National Association of Math Circles. She served as the founding Director of the National Association of Math Circles, serving in that capacity from 2007 to 2009 and again as Director during Academic year 2012-2013. She has also served as the Director of the San Francisco Math Circle, Bay Area Circle for Teachers, and UC Davis Explore Math Programs. Dr. Wiegers has used her broad experience with Math Circles to create a national survey to evaluate the impact of students who participated in Math Circles. This evaluation tool was developed for the San Francisco Math Circle and is currently being adapted for use in the broader Math Circle community. Dr. Wiegers was also responsible for coordinating NAMC's role in the 2015 "How to Run a Math Circle" mini-course. The materials developed for this course will be used to start the mentorship training materials for 2015-16. Dr. Wiegers received her Ph.D. in Applied Mathematics from the University of California Davis in 2008. After her Ph.D. Dr. Wiegers worked on various STEM Outreach projects as a Project Director of Mathematical Outreach and Enrichment for the Mathematical Sciences Research Institute in Berkeley and San Francisco State University. This year Dr. Wiegers joined the faculty of Central Washington University and is currently working to create an Elementary Math Circle program in Ellensburg, Washington.

**Growing problem solving skills through Math Circles**

Math Circles are a form of education outreach and enrichment through which mathematicians and mathematical scientists share their passion with K-12 teachers and students. Math Circles combine significant content with a setting that encourages a sense of discovery and excitement about mathematics through problem solving and interactive exploration. Ideal problems are low-threshold, high-ceiling; they offer a variety of entry points and can be approached with minimal mathematical background, but lead to deep mathematical concepts and can be connected to advanced mathematics. Dr. Brandy's presentation will share tips on how to get involved in Math Circles and some great math problems.
SPECIAL THANKS TO

The Conference Committee:

Siamack Bondari, Brian Camp, Monika Kiss, Kevin Murphy and Jacqueline White

Saint Leo University

Vendors:

Cengage and Pearson