Abstracts

Friday, February 15

1:00-1:50 pm

Room
BM Auditorium

Plenary Session
'FLATLAND: THE MOVIE' AND BEYOND

Tom Banchoff, Brown University

Abstract: Now that "Flatland: the Movie" is reintroducing new generations of students to the dimensional analogy, how can we as teachers follow up the viewing experience to frame and direct geometric challenges for all levels?

2:00-2:45 pm

Room **Boundary Distributions with Respect to Chebychev's Inequality**
PS 205 David Rose, Florida Southern College

Abstract: A three-valued symmetric discrete variable is often offered as an example showing that Chebychev's inequality is sharp. We refer to the distribution of such a variable as a boundary distribution and show that for each $k > 1$, the standardized k-boundary distribution is unique.

Room **Calculus without Pain**
PS 204 David Sprecher, University of California-Santa Barbara

Abstract: The standard teaching of calculus follows a dual track. The first is its conceptual framework and the second is computational. I am proposing to put the computational track first. Like the teaching of arithmetic, algebra and geometry at lower levels, an approach can be developed to enable the presentation of calculus directly as a tool, through clearly organized rules and formulas, deferring a discussion of its theoretical foundation to the end. The pedagogical strategy is this: The derivative is introduced as a way of forming new functions from old ones by using a certain set of rules. Derivative and integral rules are introduced with the most familiar and friendly objects: polynomials. The same format is repeated with expanded function classes, thereby giving the student reference points against which to check a more general setting with a simpler one. This treatment is completely self-contained, allowing the student to concentrate exclusively on the mechanics of calculus, similar to the process of learning the multiplication table or division. When transfer of knowledge to applications comes, the student's attention can be devoted entirely to the interpretation of these new tools and their use in solving diverse problems.

Room **A Mathematical Model for the Human Runner**
PS 155 Ted Andresen, Saint Petersburg College

Abstract: A human runner can be modeled simply as a concentrated mass bouncing along on a set of spring-like legs. The model can be used to understand how the runner moves and how they expend energy. The presentation will demonstrate the model and explain the mathematics behind it.

Room **Orbits of Operators**
PS 202 Stephen Rowe, Wilkes Honors College, Florida Atlantic University

Abstract: In this talk we discuss orbits of operators. Given a bounded linear operator T and a vector x in a normed space X, we say that an orbit of the operator T is a set {x, Tx, T^2 x, ...}. We will analyze convergence of these orbits and discuss their relation to the invariant subspace problem.

Room **Lebesgue Measure and Lebesgue Integral**
PS 202 Justin Owen, Wilkes Honors College, Florida Atlantic University

Abstract: We discuss the idea of Lebesgue measure and give examples of Lebesgue measurable sets such as the Cantor set. We also demonstrate the advantages of Lebesgue integral over the Riemann integral by using Dirichlet function as an example.

3:00-3:45 pm

Room **Defining Graphs by Subgraphs**
PS 205 Daniela Genova, University of North Florida

Abstract: We present a new way of defining classes of graphs which requires the presence or absence of certain subgraphs. Characterizations of familiar classes of graphs such as trees, bipartitie graphs, complete graphs and k-regular graphs will be presented.

Room **Teaching Applied Calculus to the Millenial Generation**
PS 204 Martha Goshaw, Seminole Community College

Abstract: Most of today's college students belong to the Millenial Generation, a confident multi-tasking group of computer literate high achievers. The presenter (a veteran Baby Boomer) will share several strategies for bridging the generation gap in the teaching of applied calculus.

Room **Biofuels, Arithmetic, and Embodied Energy**
PS 155 Ben Fusaro, Florida State University

Abstract: Biofuels, and the widely-accepted notion that they can replace fossil fuels, can lead to major economic consequences for developed, developing and undeveloped countries. A combination of a few examples, arithmetic, some qualitative reasoning and the concept of embodied energy is sufficient to allow a judgment on whether this notion is sound.

Room **Student Sudoku Contest**
PS 202 Organized by Dan Jelsovsky, Florida Southern College

5:00-5:45 pm

Room **Harmonic Series Problems and Solutions Everyone Should Know**
PS 205 Scott Hochwald, University of North Florida

Abstract: The Harmonic Series and various decimations of it and assaults upon it have fascinated people for centuries. This talk will contain a collection of those results along with some elegant/entertaining proofs.

Room **The Power of Dimensional Analysis**
PS 204 I. A. Sakmar, University of South Florida

Abstract: The physicists have a powerful tool which the mathematicians rarely need. It is dimensional analysis. However there are some areas in mathematics where it can be used successfully. Here we apply it first to a simple problem to demonstrate the technique used. Next we try it on a more challenging problem. The application leads to a simple result, but also raises some questions.

Room **The Apportionment of the U.S. House of Representatives from 1787 till the Present**
PS 155 Fredric Zerla, University of South Florida

Abstract: The Constitutional Convention of 1787 established a House of Representatives whose members were to be "apportioned among the several States … according to their respective numbers (population)." This was much easier said than done. We examine the many techniques used to meet this criterion from 1787 till 1941 when the present system was established by law.

Room **Why .999…is and is not equal to 1**
PS 202 Bill Rosenthal, University of South Florida, Stacy Cordes, Seminole Middle School

Abstract: This interactive session develops two theories: (a) It is educationally best to believe that 0.999… is and is not equal to 1 (from our own research); (b) It is mathematically legitimate to believe that 0.999…is and is not equal to 1 (using Lakoff and Núñez, *Where Mathematics Comes From*).

6:00-6:50 pm

Room **Plenary Session**
BM Auditorium **BRIGHT LIGHTS ON THE HORIZON**
Deanna Haunsperger, Carleton College

Abstract: What do a square-wheeled bicycle, a 17th-century French painting, and the Indiana legislature all have in common? They appear among the many bright stars on the horizon of mathematics, or perhaps, more correctly, in *Math Horizons*. *Math Horizons*, the undergraduate magazine started by the MAA in 1994, publishes articles to introduce students to the world of mathematics outside the classroom. Some of mathematics' best expositors have written for *MH* over the years; here are some of the highlights from the first ten years of *Horizons*.

Saturday, February 16

9:00-9:45 am

Room **Heron Triangles which Cannot be Decomposed into Two Integer Right Triangles**
PS 205 Paul Yiu, Florida Atlantic University

Abstract: A Heron triangle is one whose sides and area are integers. While it is quite easy to construct Heron triangles by joining two integer right triangles along a common side, there are some which cannot be so obtained. For example, the Heron triangle (25,34,39) has integer area 420 but no integer altitude. In this talk, a systematic construction of such indecomposable Heron triangles will be presented.

Room **Mathematics Courses for Liberal Arts and Elementary Education Majors**
PS 152 Steven Blumsack, Florida State University

Abstract: Course offerings in mathematics for liberal arts and elementary education majors in Florida's public universities and community colleges are limited. This presentation will describe the current situation in Florida and other states, plus recommendations from professional societies and the mathematics education literature.

Room **Mental Math: The Sum and Product Game (Beginning through Advanced)**
PS 155 Patrick Bibby, Miami Dade College

Abstract: The ability to do mental math is undervalued by many mathematics educators ("show all your work or you won't receive any credit") but is possessed by the best and brightest students. It is a skill that needs to be developed early and reinforced frequently. One approach is through games that require students to perform mental calculations. One such game, the Sum and Product Game (with some suggested variations), is presented here. In its most elementary form, the Sum and Product Game can be used to reinforce addition and multiplication of positive integers. As students progress through arithmetic, pre-algebra, algebra, and higher, the game can be adapted to suit these levels.

Room **Student Integral Contest**
PS 202 Organized by Dan Jelsovsky, Florida Southern College

10:00-10:45 am

Room **Normal Functions of the First Category and Complex Differential Equations in the**
PS 205 **Unit Disk**
Kari Fowler, University of Tampa

Abstract: Consider the differential equation $f'' + A(z)f = 0$. In this presentation, we investigate the influence of the normality of the coefficient $A(z)$ on a solution f and also the influence of the normality of a solution f on $A(z)$. In particular, we consider normal meromorphic functions of the first category.

Room **Statewide Course Numbering System (SCNS) Mathematics Activities: 1990's to the**
PS 152 **Present and Beyond**
Matthew Bouck, Deputy Director, Office of Articulation, FDOE

Abstract: The presenter will highlight some of the past activities at the state level related to mathematics many of which led to the current math course offerings in the common course numbering system. He will also describe some of the upcoming activities emanating from the state that are directly connected to mathematics and are mostly concerned with the identification of post-secondary mathematics competencies.

Room **Derivation of Conservation Relationships for Branched Metabolic Pathways Using**
PS 155 **MAPLE**
Mustafa Bayram, Yildiz Teknik Universitesi

Abstract: In order to make kinetic analysis of a metabolic pathway, construction of mathematical model describing its kinetics is a major part of the work. In the framework of metabolic kinetic theory, it is assumed that the rate of changes in the concentration of a metabolite *ix iX* is the sum of the reaction rates, each weighted by corresponding stoichiometric coefficient of *r iX*. Using *v* and *x* to denote the rate vector and concentration vector respectively, mathematical model for kinetics of a system can be written as $dNv/dt = \mathbf{x}$ where is stoichiometric matrix which represents how the metabolites involved in the system combine. Derivation of conservation relationship which mainly depends on decomposition of stoichiometric matrix plays important roles in constructing mathematical model of the system. In present the study, we have developed a computer program in MAPLE in order to derive all of the conservation relationship for a given metabolic pathway automatically that can be applied to any pathway which may include unlimited steps and intermediate metabolites.

Room **The ABC Conjecture – Facts and Figures**
PS 202 Christian Bowers, University of North Florida

Abstract: The ABC conjecture is easily stated yet if correct has a profound impact on the theory of numbers. This presentation will investigate the ABC conjecture, give a brief history of its development, show how it relates to many problems in number theory, and give an overview of the current status of research on this simple yet profound conjecture.

Room **The GIMP Project – The UNF Experience**
PS 202 Jonathan Nielsen, University of North Florida

Abstract: GIMPS, the Great Internet Mersenne Prime Search is one of the largest problems being solved via distributed computing. This presentation will discuss the distributed computing model, the factoring methods that the program uses, and the results of the tests performed by the UNF team, as well as future numbers to be tested.

11:00-11:45

Room **Visualizing Milnor's Fibration Theorem**
PS 205 Daniel Dreibelbis, University of North Florida

Abstract: Milnor's Fibration Theorem gives some remarkable ways to split up space into families of equivalent objects. In this talk, we describe the theorem, describe how we can view some of the theorem's consequences, connect the results to fibered knots, and then use computer graphics to see the fibrations in action.

Room **Two College Algebras?**
PS 152 Don Ransford, Laurice Garrett, and JoAnn Lewin, Edison College

Abstract: In the late 1990's, the SCNS Mathematics Committee recommended the adoption of a single, state-wide College Algebra course (MAC 1105) to replace the previous two-pronged approach which catered to calculus-bound students and all other degree-seeking students. However, based on a discussion that took place at the FTYCMA Fall 2007 Retreat, enrollments in MAC 1105 seem to have gradually shifted away from calculus-bound students causing faculty to adjust their expectations and curriculum for the course. This session is intended to be a continuation of the discussion begun at the Retreat. The presiders will attempt to gather additional feedback from community college and university professionals as to the feasibility of creating a second College Algebra course for non-calculus bound students that will still meet the needs of accrediting bodies and transfer institutions.

Room **Weighted Statistical Convergence**
PS 155 Vatan Karakaya, Adiyaman University

Abstract: In this paper, we use the notion of $(\bar{N}, p_n)$- summability to generalise the concept of statistical convergence. We call this new method as weighted statistical convergence and $S_{\bar{N}}$ denotes the set of sequences which are weighted statistically convergent.We also establish its relations with statistical convergance, $(C,1)$ -summability and strong $(\bar{N}, p_n)$-summability.

Room **Ideas for Using Robotics Applications in Undergraduate Mathematics Courses**
PS 202 Alan George and Ian Johnson, Florida Southern College

Abstract: We discuss possibilities for using robotics applications to provide modeling and computation examples for undergraduate mathematics courses. The mathematics examples we will present are based on our recent work in exploratory robotics research and include problems from college algebra, pre-calculus trigonometry, discrete mathematics, and statistics.

Room **Your Teacher was Right: You Can't Get an A if You Don't Show Up to Class and**
PS 202 **Do Your Homework**, Rebecka Epps, Wilkes Honors College, Florida Atlantic University

Abstract: Dr. Robin Jordan of Florida Atlantic University and I analyzed five semesters worth of data from his Physics classes to see if a correlation between attendance and class performance existed. We found that, while consistent attendance betters a student's likelihood of achieving a higher grade, it does not ensure exceptional class performance. Also, we analyzed six semesters worth of data from his classes to see if homework and class performance have a correlation with one another. With this analysis, we found that participation on homework betters a student's probability of receiving a particular letter grade (e.g. B+), but does not significantly increase a student's probability of a higher score within the interval of the letter grade (i.e. a student with a B+ is just as likely to get an 87 as she is an 89).

12:00-12:50 pm

Room
BM Auditorium

Plenary Session

RANDOM WALKS AND NETWORK TOMOGRAPHY

Patrick McDonald, New College of Florida

Abstract: A network is a graph with added structure associated to its vertices and/or edges. Networks occur as models for a remarkable spectrum of phenomena, with well known applications in the natural sciences and engineering. In this talk I will discuss a collection of interesting inverse problems for networks which may be roughly described as follows: Consider a network as a "black box" and suppose that we are permitted to perform a number of experiments designed to probe the internal structure of the box. Under what conditions do the experiments determine the network? Given the inverse problem has a unique solution, how can we recover the network? Three such inverse problems will be discussed in detail, each of which involves networks whose added structure includes the rules for a random walk on the vertices of the underlying graph. There will be a number of suggestions for future projects, many of which are appropriate for students. The talk will be self-contained and intended for a general scientific audience.