Abstracts for Contributed Papers: 2012 Section Meeting

(Note: due to scheduling constraints, some talks may be moved to other sessions)

Session: Undergraduate

Speaker: Jeffrey Spears, Erin Mithcell, Christopher Eckler,& Simon Harjo, East Central University
Title: Cantor-like Constructions
Abstract: In this paper we look at sets that are constructed in the same way as the standard Cantor set. We look at appropriate tools to study these sets, in particular probability measures supported on them

Speaker: Jones Carlson, Henderson State University
Title: The Expansive Property on Intervals
Abstract: We will look at continuous functions on closed, bounded intervals and prove that they cannot be expansive maps.

Speaker: Kathleen McNamara, University of Central Oklahoma
Title: New Definition – New Derivative
Abstract: The derivative of a function f at $x = a$ has a well known definition, which is the limit as x approaches a of the difference of $f(x)$ and $f(a)$ over the difference of x and a. I examine how the properties of the derivative change if the definition is altered to the difference of $f^2(x)$ and $f^2(a)$. This new definition of a derivative, which we call the "box derivatice" provides a non-linear operation on functions with properties that in some way mimic those of the "regular" derivative.

Speaker: Andres Calderon Jaramillo, University of Central Oklahoma
Title: Modeling Jazz Artist Influence Mathematically: A Preliminary Investigation
Abstract: The goal of this project is to provide insights into the modeling of jazz artist influences using Markov chains and variations. This research will attempt to expand and improve methodologies from areas such as automated music composition and style recognition in order to build a new model of influences among jazz music.

Speaker: Brian Scott, East Central University
Title: But What's the Point?
Abstract: Application of Trigonometry and simple Calculus relevant to Controlled Source Seismology and other applications of Snell's Equation.

Speaker: Janne Klassen, East Central University
Title: Use of Laplace Transforms for Partial Differential Equations
Abstract: In this honors project for Differential Equations I am learning about the differences in partial differential equations. One way to solve these is to use Laplace transform to change a partial differential equation into an ordinary differential equation.

Speakers: Jared Wolf, Arkansas State University – Jonesboro
Title: Dynamic Motion of Particles with Adhesion
Abstract: In this work, our differential equations describe a physical situation where a particle drops down onto an adhesive stationary rigid foundation and bounces off after its impact. When the Signorini contact conditions with adhesion are imposed on the particle, the dynamic motion of the particle is expressed by the second order ordinary differential equation (ODE) $u_{tt} = f(t) + N_C(t) - \kappa(u-\varphi)\beta^2$ where the contact forces $N_C(t)$ satisfy the complementarity conditions $0 \leq u(t) - \varphi \perp N_C(t) \geq 0$. Also, the evolution of adhesion is formulated by the first order ODE $\beta_t = -\frac{\kappa}{a}(u-\varphi)^2\beta$, where the positive constant a is called the adhesion rate and the positive constant κ is the bonding coefficient. We investigate this problem both by numerical analysis and by the continuous formulations. Time discretization is used along with the implicit Euler method to set up numerical formulations and implement our numerical schemes. In addition, the energy balance is justified both theoretically and numerically. Multiple Taylor polynomials are also considered to approximate the solutions and are compared with the numerical method.

Speaker: Alyssa Eickenhorst, East Central University
Title: Solving Partial Differential Equations Using the Fourier Transform
Abstract: Partial differential equations are not a part of my Differential Equations class. For my honors project I will be solving examples of partial differential equations using the Fourier transform. This transform enables us to solve a PDE using an ordinary differential equation.

Speaker: Heather P Magee, University of Central Oklahoma
Title: Exploring the Triangle and Tetrangle Inequalities using Euclidean Squared Distance Matrices
Abstract: A distance matrix A which encodes squares of pairwise distances in matrix form is known as a Euclidean Squared Distance Matrix (ESDM). Bordered ESDMs are useful in determining the embedding dimension of points in space. We use these bordered ESDM's to generalize the concept of the triangle inequality and extend these ideas to the tetrangle inequality (bounds on unknown distances using four points in three dimensional space).

Speaker: Jonathon Loftin, Southern Arkansas University
Title: Spectrally Arbitrary Antipodal Tridiagonal Tree Sign Pattern Matrix
Abstract: A nxn sign pattern matrix S = [s_{ij}] has s_{ij} element of {+,-,0} and it defines a sign pattern class of real matrices Q(S) ={A = [a_{ij}] element of $M_n(R)$: sign(a_{ij}) = s_{ij} for all i,j}. Matrix S is called a Spectrally Aribitrary Pattern (SAP) if it allows any eigenvalue. Similarly, S is a minimal SAP (MSAP) if S is a SAP, but not if one or more non-zero entries is replaced by zero. I use Nilpotent-Jacobson Method to prove that the antipodal tridiagonal TSP matrix of dimension 17 is a MSAP.

Speaker: Casey Pierson, University of Central Oklahoma
Title: Multiple Positive Solutions for a Discrete 2n-order Boundary Value Problem
Abstract: The purpose of this research is to investigate the existence of multiple positive solutions for a 2n order difference equation that satisfies the nonhomogeneous conjugate boundary conditions. In transforming the 2n order equation into a system of n second order boundary value problems, and applying the Guo-Karsnoesel'skii Fixed Point (GKFP) Theorem, the existence of at least three positive solutions can be guaranteed. The ideal attainment of this solution set is the focus of current progress, and research is ongoing.

Speaker: Laura White, Arkansas State University – Jonesboro
Title: Construction of Generalized Minimum Abberation Designs of 36, 40, and 44
Abstract: Regular fractional factorial designs are widely used experimental designs for studying effects of two or more variable simultaneously, but leave large gaps in run size. I will be working with non-regular fractional factorial designs which allows more variability. My research will focus on construction of optimal designs 36, 40, and 44 runs using graphic processing unit (GPU) technology, with a primary objective of providing, for the first time, comprehensive design tables for the best 36, 40, and 44 runs designs available. Creating design tables make it possible for engineers and scientist to plan experiments for any combination of runs and number of variables to be studied.

Speaker: Jon Calhoun, Arkansas State University – Jonesboro
Title: Dynamic Contact of Viscoelastic Rods with Two Stops: Numerical Approaches
Abstract: We consider a viscoelastic rod that moves between two stationary rigid stops, where contact forces take place only when the rod is in contact with a stop. This dynamic contact problem satisfies Signorini's contact conditions which can be interpreted in terms of complementarity conditions. The motion of the viscoelastic rod is modeled by a third order partial differential equation. In order to obtain numerical approximations, we discuss numerical schemes based on time discretization over the time space and finite element methods over the spatial domain. The numerical solutions for each time step are computed by solving a linear system and applying the complementary conditions. Boundedness of energy is investigated with these numerical solutions, which plays an important role in being able to justify numerical stability.

Speaker: Seth Carter, Oklahoma Wesleyan University
Title: Tetrahedral Kites and Sierpinski's Pyramid
Abstract: In the naïve spirit of chasing a world record, we try to build the largest tetrahedral kite we can on a budget. Along we the way, we notice its geometrical iterative features and its similarity to Sierpinksi's Pyramid, and ask of its educational value to young mathematicians, including: pyramidal geometry, platonic solids, iterations, fractals, dimensions, and growth of scale.

Speaker: Princess N. Hayes & Quinten Walter, Langston University
Title: The Dynamics Of the Spread of Staph Infections in Hospitals
Abstract: The Mathematical modeling, analysis, and numerical simulation of the dynamics of the spread of Staph infection will be presented. Some numerical experimental (in Matlab) results will also be presented.

Speaker: Quinten Walter & Princess N. Hayes, Langston University
Title: The Dynamics Of HIV Infection
Abstract: The Mathematical modeling, analysis, and numerical simulation of the dynamics of HIV infection will be presented. Some numerical experimental results(in Matlab) will also be presented.

Speaker: Adam Hardesty, Oklahoma Wesleyan University
Title: Bend it like a Mathematician: Differential Equations Study of a Soccer Free-Kick
Abstract: Top soccer athletes have an ability to bend the trajectory of a soccer ball, particularly around a wall of defenders during a free kick. We attempt to model this soccer-ball flight with a set of 2^{nd}-order differential equations, which incorporate gravity, the drag force (due to air resistance) and the Magnus force (due to air pressure differences from a spinning ball). We see if these results seem to match with observed phenomenon, and see if they suggest a particular strategy for maximizing success.

Speaker: Dallas Lewis, Oklahoma Wesleyan University
Title: Newton's Law of Cooling with a Varying Ambient Temperature
Abstract: What is the time of death for a body in the bathtub in a room with the window open as the sun goes down? Newton's description of a cooling object in a constant temperature environment is well known, producing a much-studied, solvable 1^{st}-order differential equation. But we ask: What happens when the ambient temperature is varying itself, including linear, exponential, sinusoidal, and other forms of change? What happens when the ambient environment has its own ambient environment, and it has one, etc.? These types of questions, including the looming bathtub question, will be addressed both mathematically and experimentally.

Speaker: Kirsten Stevenson, Oklahoma Baptist University
Title: Berkeley Fails to See the Reason
Abstract: This paper covers the topic of Bishop George Berkeley's criticism of Newton's calculus. It outlines some of Berkeley's main objections, as well as the rather intense public reaction his criticism garnered from other mathematicians of that day.

Speaker: Nitesh Verma, Cameron University
Title: Generating Lemniscate
Abstract: To generate Lemniscate of Bernoulli by constructing tangents to Rectangular Hyperbolas.

Speaker: John King, Oklahoma Wesleyan University
Title: The Traveling Arkansan Coffee-Drinking Mathematician Problem
Abstract: We bring the famous and classic Traveling Salesman Problem (TSP) closer to home, trying to find the shortest route for: a) visiting all MAA universities in Arkansas, and b) visiting every Starbuck's city in Arkansas – where mathematicians perform best. These home-grown scenarios are used to explore the performance of several TSP algorithms, including brute-force, nearest neighbor, greedy algorithm, insertion, 2-opt, and others.

Speaker: Quinten Walter & Princess N. Hayes, Langston University
Title: Chaos in Secure Communications
Abstract: Many attentions have been paid to fundamental research around chaotic systems. These systems have the capability to benefit the field of communication such as security and encryption, multipath and spectrum spreading. This work focuses on using operational amplifier (op-amp) to present a step by step method to solve linear and differential equations. It describes a procedure for designing op-amp circuits to implement linear and nonlinear algebraic equations. It will extend its application to synchronized chaotic circuits for secure communication. Chaotic signals are unpredictable yet they can be synchronized in a way that can benefit the secure communication field of study. Through the synchronization of coupled chaotic circuits, information can be scrambled effectively, which can be used for private and secure communications. By successfully synchronizing two chaotic circuits, one has the ability to transmit a signal that will be completely secure.

Speaker: Tabitha Heaton, Stephanie Maas, and Bobby Carnes, East Central University
Title: Set, Is It More than Just a Game?
Abstract: The game of Set has a number of interesting algebraic properties. In this talk, we define an operation on the cards of the game and show that the result is a nonassociative quasigroup. We then further examine other common algebraic properties in order to fully describe this quasigroup.

Session: Graduate

Speaker: Benjamin Wescoatt, Oklahoma State University
Title: What Is a Trig Identity?: Students' Perspectives
Abstract: This talk concerns preliminary results from an exploration of undergraduate trigonometry students' notions of trigonometric identities. Students were requested to state whether or not they believed five given equalities were identities; they then provided their rationale for their decisions. I will provide the statistics on each equality and general classifications of their rationales. I will then share my speculations about what these results mean for trigonometry students.

Speaker: Melissa Mills, Oklahoma State University
Title: Investigating the Teaching Practices of Professors when Presenting Proofs: The Use of Examples
Abstract: There have been very few studies addressing the actual teaching methods of university mathematics professors, despite repeated calls for such studies. This talk presents an analysis of both interview and classroom observation data from four faculty members who are teaching upper-division proof-based mathematics courses. In particular, this study will address the different ways in which they use examples when presenting proofs in class.

Speaker: John Greene, Henderson State University
Title: A Comparison of Online Learning to the Traditional Classroom Environment on Student Performance in Mathematics for the Liberal Arts at Henderson State University
Abstract: A comparative history of the rates of student success in each of the two methods of instruction since we began offering the course online in the fall of 2009. Possible explanatory factors will be presented.

Speaker: Kelsea Cox, Arkansas State University – Jonesboro
Title: Constructing Nonregular Robust Parameter Designs for Quality Improvement
Abstract: Robust parameter design is used in manufacturing and quality improvement to optimize performance and make processes insensitive to variation in nuisance noise factors. Optimal settings of control variables that minimize the effects of the noise variables are found by exploiting the interaction between control and noise variables. Experimental designs to study these effects are called robust parameter designs. A forward selection algorithm for constructing optimal nonregular robust parameter designs for industrial application has been investigated.

Speaker: John Paul Cook, University of Oklahoma
Title: How Proofs That Justify Structure Can Support Students' Reinvention of Ring, Integral Domain, and Field
Abstract: In an effort to clarify the purposes and aims of different proofs for more effective use in the classroom, Weber (2002) named and detailed four basic types. In particular, he characterized "proofs which justify the use of a definition of axiomatic structure" as a proof in which "the assumptions that one is making are questionable, but the conclusion is regarded as obvious." Moreover, he noted, such proofs are "technical, difficult, and decidedly non-intuitive." In this talk, I suggest that, in certain cases, such proofs can be effective pedagogical tools (despite their reputation). In particular, I present results from a project which investigates how students can reinvent the fundamental notions of ring and field theory by asking the question, "What properties do we need to be able to solve the additive and multiplicative cancellation equations?"

Speaker: Nathan Pezant, University of Central Oklahoma
Title: Exploring Outcomes of a Variation of the Definition of the Derivative
Abstract: We will be looking at the new (yet mostly familiar) outcomes of functions after differentiating by a slight variation of the derivative. Specifically if the two terms in the numerator (F(x) and F(a)) are raised to the power of *k*. We will call this variation of the derivative the box derivative to distinguish it from the traditional definition.

Speaker: Nathan Bloomfield, University of Arkansas – Fayetteville
Title: Inverse Semigroups, Symmetry, and Difunctional Relations
Abstract: Symmetry is an important and powerful unifying concept in modern algebra. We will discuss the history of symmetry as a tool in mathematics and the interaction of abstract and concrete representation of symmetry.

Session: General

Speakers: Fred Worth, Henderson State University
Title: Branch Rickey and Sabermetrics: Baseball and Correlation
Abstract: We will look at a baseball statistic proposed by Branch Rickey and its correlation to team winning percentages. We will also consider how it compares to a few other statistics.

Speaker: Christian Constanda, University of Tulsa
Title: From the Clock Face Challenge to the Unary Chain Conjecture
Abstract: Solutions of the three levels of difficulty of the clock face challenge will be presented and then generalized to the conjecture stating that any positive integer can be generated from any of the natural numbers 3,…,9 by means of a finite chain of unary non-alphanumeric operations.

Speaker: Larry A. Lucas, University of Central Oklahoma
Title: Majorizing Functions on Finite Ordered Sets
Abstract: This paper explores majorizing functions, in both sum and product, on finite, ordered domains. We look at specific conditions under which majorization in sum implies majorization in product in the totally-ordered case, and suggest an extension to the quasi-ordered case.

Speaker: Thomas Milligan, University of Central Oklahoma
Title: Minor Monotone Floor and Ceiling of Certain Graph Parameters
Abstract: A graph parameter is minor monotone if it preserves the minor relation. We consider the transformation of real-valued graph parameters into related minor monotone graph parameters using two different methods. The minor monotone floor and the minor monotone ceiling of a number of graph parameters are considered. Particular attention is given to parameters that relate to the zero-forcing number. Results dealing with the Hadwiger conjecture are also considered.

Speaker: Michael Lloyd, Henderson State University
Title: Intersections of Cylinders
Abstract: The intersection of circular cylinders of differing radii and various angles is explored algebraically, numerically, and graphically.

Speaker: Debra Coventry, Henderson State University
Title: A Unique Approach to General Education Assessment: Quantitative Literacy
Abstract: An open discussion of general education assessment at Henderson State University – Arkansas' Public Liberal Arts University. Can we conduct genuine assessment as a part of what we already do as educators? Including reflections from recent NCATE and HLC visits.

Session: Topology

Speaker: Ray Hamlett, Oklahoma Christian University
Title: Lindelof with Respect to an Ideal
Abstract: A topological space is Lindelof with respect to an ideal I if every open cover of the space has a countable subcollection which covers all the space except for a set in the ideal. A space is shown to be weakly Lindelof iff it is Lindelof with respect to the ideal of nowhere dense sets. Examples and other basic ideas are explored.

Speaker: Andrew Bucki, Langston University
Title: Some Properties of Special Topological Groups
Abstract: In this presentation I consider special topological spaces that are equipped with algebraic and differentiable structures. Examples of such topological spaces are Lie groups. By introducing certain diffeomorphisms of these spaces and imposing some algebraic conditions on them, it is possible to determine some interesting properties of these spaces.

Session: Analysis

Speaker: Abebaw Tadesse, Franklin Fondjo, & Andrew Bucki, Langston University
Title: Compact Composition Operators on the Hardy-Simirnov Spaces
Abstract: For a simply connected domain G properly contained in $\mathbb{C}$, we apply the recent results of \cite{sei} to give estimates for the essential norm of composition operators on the Hardy-Smirnov space $E^p(G)$. As a corollary to these results, we present characterizations of compactness of bounded composition operators on $E^p(G)$ and give an example illustrating the main results.

Speaker: Britney Hopkins and Kristi Karber, University of Central Oklahoma
Title: Existence of Solutions for Certain Differential Inclusions
Abstract: This presentation is joint work among four faculty members at the University of Central Oklahoma. We prove an existence result for higher order differential inclusions with given initial conditions.

Speaker: Aderaw Fenta, Arkansas State University – Jonesboro
Title: Basic sequences generated by lacunary power sequences in $L_p[a,b]$
Abstract: Let $0 \leq a < b$ and $1 \leq p < \infty$. If $h \in L_p[a,b]$ is an increasing function with strictly positive and bounded derivative on $[a,b]$, then we will show that the sequence $\{h^{\lambda_k}\}_{k=1}^{\infty}$ is a basic sequence in $L_p[a,b]$ for every lacunary sequence $\{\lambda_k\}_{k=1}^{\infty}$ of real numbers.

Speaker: Tom McNamara, Southwestern Oklahoma State University
Title: Applications of the Calderon Condition
Abstract: We examine a criteria discussed by Calderon in a paper from 1964. This "Calderon Condition" has proven indispensable in the construction of wavelet transforms. Our talk focuses on several theorems that make use of Calderon's result in different contexts.

Session: Algebra

Speaker: Neeraj Bajracharya, Southern Arkansas University
Title: Minimum Angle of Rotation Required for Jordan Product to be Indefinite
Abstract: Given a real $n \times n$ matrix A, write φA for the maximum angle by which A rotates any unit vector: $\varphi_A := \sup x \in Sn-1 \angle(x, Ax)$. Suppose that A and B are positive definite symmetric (PDS) $n \times n$ matrices. Then their Jordan product $\{A,B\} := AB + BA$ is also symmetric, but not necessarily positive definite. We propose solution to the following problem: For commuting PDS matrices A and B, compute $\Phi(A,B) := \inf\{\varphi_S : S \in \mathrm{SO}n$ and $\{A,B^S\}$ is indefinite$\}$, where $\{A,B^S\} := ASBS^{-1} + SBS^{-1}A$ is the Jordan product of A and SBS^{-1} and φ_S denotes the maximum angle by which S rotates any unit vector. We will describe the level curves of the angle function of a 3×3 PDS matrix and use it to give proof for minimum angle of rotation required for the Jordan product to be indefinite.

Speaker: Guy R. Biyogmam, Southwestern Oklahoma State University
Title: Lie n-
Abstract: We recently introduced the category of n-racks as a generalization of the category of Racks to n-ary operations. In this talk we discuss several results related to these objects. In particular we stress their relationship with Leibniz n-algebras. We will also comment on their cohomology and their fuzzification.

Speakers: Nicholas Zoller, Southern Nazarene University
Title: The Mathematics of Cubic Sudoku
Abstract: In the last decade the Sudoku puzzle has become quite popular. Mathematicians are among the most dedicated Sudoku puzzle solvers. They have also attempted to answer questions related to the structure of the puzzle itself. How many distinct Sudoku puzzles can be made? What number of clues guarantees a unique solution? In this talk we consider a variant of Sudoku called Cubic Sudoku. It is played on a board set up to look like three adjacent faces of a cube. The regular Sudoku rules apply, and a new rule is added. Following the lead of other Sudoku researchers, we use Gröbner bases to attempt to count the number of distinct puzzles. We also show how to use the rules of the game to solve puzzles efficiently.

Session: Mathematics Education and Classroom Notes

Speaker: Eileen Faulkenberry, Texas A & M University – Commerce
Title: Transforming Transformations of Functions
Abstract: Transformations of functions is a topic often taught by memorizing and applying rules without an understanding of the underlying concept. This presentation will discuss a conceptual approach to teaching this topic which has shown significant growth in students' conceptual understanding of transformations of functions.

Speaker: Krista B. Hands, Sarah L. Marsh, & Shannon M. Griffith, Oklahoma Baptist University
Title: Helping Tutors, Helping Students
Abstract: A mathematics tutoring center can be an invaluable part of undergraduates' experiences with mathematics. But, what happens when peer tutors are asked to assist with mathematics courses that they never took as university students? We will describe the steps we have taken to increase tutor efficacy—and student satisfaction—in our tutoring center. We will explore both faculty and student perspectives as we discuss our efforts to improve the quality of mathematics tutoring on our campus.

Speakers: Carolyn S. Eoff, Henderson State University
Title: An Interesting Application of Dirichlet's Theorem
Abstract: It is a standard exercise in beginning calculus to prove that the sequence $\left\{\frac{\sin(n)}{n}\right\}$ converges. However, determining the convergence or divergence of the associated series is much less straightforward. Dirichlet's Theorem is a generalization of the alternating series test, and is generally not among the convergence tests commonly taught in undergraduate calculus. It can be used to prove the conditional convergence of the series $\sum_{n=1}^{\infty} \frac{\sin(n)}{n^p}$ for $0 < p \leq 1$. (This is an exposition of a result of Gilles Cazelais and possibly others.)

Speaker: Anita Walker, East Central University
Title: Technique versus Accuracy: Is One more Important Than the Other?
Abstract: What to do … Give credit for correct answers if the techniques used are incorrect? Give credit for the right techniques if the results are incorrect? While the opinions of instructors may vary, the examples in the presentation provide food for thought.

Speakers: Jill E Guerra, University of Arkansas – Fort Smith
Title: POGIL Math: Not Your Everyday Group Work
Abstract: The POGIL pedagogy has enjoyed a great deal of success in chemistry classrooms. We will give a brief introduction to this method and discuss current NSF-funded efforts to produce POGIL materials for mathematics courses.

Speakers: Debra Coventry, Henderson State University
Title: No, Really Get Your Phone Out
Abstract: Using technology to extend the conversations outside the classroom. Reaching out to the technologically savvy student in ways that extend and deepen their understanding of mathematics.

Speakers: Lisa Mantini, Oklahoma State University
Title: Reading Comprehension for Series Convergence Proofs in Calculus II
Abstract: In this talk we will report on the results of a teaching experiment in Calculus II. In one section of the course, students completed reading comprehension quizzes for series convergence proofs from the text in addition to the usual homework assignments. We compare the performance of both groups of students on determining series convergence, on the quality of their written series convergence arguments, and on their performance in an interview discussing series convergence.

Speakers: Andrew Bucki, Abebaw Tadesse, Dan Bailey & Franklin Fondjo, Langston University
Title: Mathematics Education Reform I
Abstract: Last year we presented illustration of the main ideas of our new educational program in mathematics. In this presentation, we will once again describe the core concepts and present examples from across the curriculum illustrating the ideas.

Speakers: Abebaw Tadesse, Andrew Bucki, Dan Bailey & Franklin Fondjo, Langston University
Title: Mathematics Education Reform II
Abstract: This presentation is a continuation of the first presentation by Dr. Andrew Bucki on new educational program in Mathematics. We will illustrate the main idea with examples on sets, relations, and functions.

Speakers: Abebaw Tadesse, Andrew Bucki, Dan Bailey & Franklin Fondjo, Langston University
Title: Mathematics Education Reform III
Abstract: This presentation is a continuation of the first presentation by Dr. Andrew Bucki on new educational program in Mathematics. We will illustrate the main idea with examples on six-pack functions, derivative functions and their applications.

Speakers: Jack L. Jackson II, University of Arkansas – Fort Smith
Title: Multiple Representations Connecting Linear and Exponential Functions
Abstract: During the summer of 2011 multiple universities in Arkansas provided professional development to Arkansas Algebra I teachers using a common curriculum statewide. This professional development centered on delivering a series of inquiry based projects emphasizing the Standards for Mathematical Practice of the Common Core Stat Standards in Mathematics. Among the topics best received was a series of three modules developing core concepts of linear and exponential functions in parallel. In this talk we will briefly discuss the context of the modules and then examine a visualization of this parallel development that uses Geometer's Sketchpad to present multiple representations of these concepts.

Speakers: Gordon C. Johnson & Merlin J Kamgue, Arkansas Baptist College
Title: Student Retention, Student Graduation Rates and Institution Characteristics: The Case of the H. B. C. U.
Abstract: The ambitious 2020 education objectives of President Barack Obama promise to highlight "best practice" academic policies and procedures that can more effectively retain students, whether they are from disadvantaged backgrounds or otherwise, and elevate their rates of graduation. Though intended to catalyze the betterment of all U. S. institutions of higher learning through the adoption of proven efficiencies in administration and instruction meaning the quantity and quality of United States college graduates would surpass that of competing nations, perhaps, for a variety of sociological reasons, no where will the challenges of Obama's objectives be measured more than among the remaining Historically Black Colleges and Universities (HBCUs). To date, in fact, as HBCUs attempt to position themselves more favorably in light of new metrics that already now are employed—or, are anticipated to be employed--in the assessment of an institution's education success, a variety of observable transformations in institutional degree programs, academic policies and other internal criteria have been noted. As one part of an effort to better understand how these administratively driven, institutional transformations will influence the characteristics of mathematics departments, math programs and especially the remedial and developmental offerings of HBCUs, this paper will attempt to capture cross-sectional correlates of the characteristics of those HBCUs that initiate and undergo substantial change. The primary data to be used in this initial analysis are published data resources particularly those available through the Southern Regional Education Board.

Speakers: James C. Price, University of Arkansas – Fort Smith
Title: Engaging Liberal Arts Students in Mathematics
Abstract: Engaging liberal arts students in mathematics can often be difficult for a variety of reasons. I present here a series of 50 minute activities that were specifically designed to engage this group of students in mathematics. These activities were developed for a college mathematics course, but they could also be used in several other lower level math courses.

Speakers: William "Bus" Jaco, Oklahoma State University
Title: Clinical Faculty: Enhancing Student Learning and Success in Entry-Level Mathematics
Abstract: The Department of Mathematics at OSU is undertaking a major initiative to enhance student learning and success in mathematics. A fundamental component of this initiative is the hiring of a number of non tenure-track faculty who will coordinate and supervise pre-calculus instruction, as well as participate in the continuing professional development of Graduate Teaching Assistants. This presentation will be about this initiative and the introduction of these new faculty into our program.