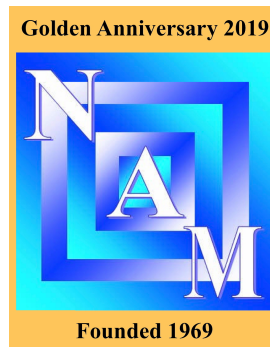


National Association of Mathematicians, Inc.

Undergraduate MATHFest XXIX



September 27 – 29, 2019

Southern University of New Orleans

New Orleans, Louisiana

<http://nam-math.org/mathfest.html#XXIX>

NAM's Undergraduate MATHFest XXIX

The National Association of Mathematicians (NAM) is a non-profit professional organization in the mathematical sciences with membership open to all persons interested in the mission and purpose of NAM which are (1) promoting excellence in the mathematical sciences and (2) promoting the mathematical development of all underrepresented minorities. NAM was founded in 1969; in 2019, we will celebrate our 50th anniversary.

NAM has five meetings every year: the Joint Mathematics Meetings in the Winter; and the Regional Faculty Conference on Research and Teaching Excellence (FCRTE) in the Spring; the Computational Sciences Institute in the Early Summer Fall; the MAA MathFest in the Late Summer; the NAM MathFest in the Fall. NAM's Undergraduate MATHFest is a three-day meeting, typically Friday through Sunday in the Fall, which rotates around the country based on NAM's regional structure. It is held annually to encourage students to pursue advanced degrees in mathematics and mathematics education. The conference is geared for undergraduates from Historically Black Colleges and Universities (HBCUs), although all are welcome to attend. The conference consists of five components:

- **Student Talks**

There will be eight talks given by undergraduate students which last 30-minutes each. Each talk should be 20 minutes long, allowing for 10 minutes of questions and answers. There will be a friendly competition for the most outstanding oral presentation.

- **Poster Presentations**

Students have the opportunity to present posters outlining their research. The Poster Session will take place Saturday afternoon from 4:00 PM - 5:00 PM. There will be a friendly competition for the most outstanding poster presentation.

- **Graduate Fair**

Universities will have an opportunity to showcase their graduate programs and interact with undergraduate students in a one-hour fair. The Graduate Fair will take place Saturday afternoon from 4:00 PM - 5:00 PM.

- **Problem Time with Dr. Cooper**

Throughout the conference, students will be presented challenge problems. Students with correct solutions will be presented prizes.

- **The J. Ernest Wilkins Lecture**

This is an hour-long talk, given by an established researcher, to motivate our undergraduates to continue to pursue research in the mathematical sciences. This year's Wilkins Lecturer is Donald Cole (University of Mississippi); his talk will be Friday from 4:00 PM - 5:00 PM.

We are thankful to sponsorship National Science Foundation (NSF), the National Security Agency (NSA), and Pomona College. This conference is based upon work supported by the NSF under Grant No. 1833234. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the National Association of Mathematicians, Inc. and do not necessarily reflect the views of the National Science Foundation.

Which MathFest Came First?

NAM's Undergraduate MATHFest began in 1991, and it inspired other similar undergraduate-focused conferences over the years.

- The Mathematical Association of America (MAA) MathFest began in 1997, with a meeting in Atlanta, Georgia. According to Zitarelli:

A historic change for MAA national meetings took place in 1996 when the AMS voted to disband its summer gatherings. The MAA decided to continue alone, adopting the name "MathFest" starting in 1997, and has sponsored this meeting every summer since then.

- The American Statistical Association (ASA) StatFest began in 2001, with a meeting on November 1, 2001 at Spelman College.
- The National Math Festival, a biennial conference which began in 2015, was originally slated to be called "MathFest." In fact, the domain name MathFest.org redirects to this conference.



NATIONAL ASSOCIATION OF MATHEMATICIANS, INC.

Welcome to NAM's Undergraduate MATHFest XXIX!

This is the 29th annual conference for NAM. We have 106 participants from 42 institutions:

- Alabama State University,
- Alcorn State University,
- Bryn Mawr College,
- California Polytechnic University Pomona,
- California State University at Fresno,
- California State University at Los Angeles,
- Central State University,
- Clark Atlanta University,
- Elizabeth City State University,
- Florida A&M University,
- Georgetown University,
- Howard University,
- ICERM,
- Institute for Pure and Applied Mathematics,
- Iowa State University,
- Jackson State University,
- Jarvis Christian College,
- Los Angeles Community College District,
- Morehouse College,
- Morgan State University,
- National Science Foundation,
- Occidental College,
- Pomona College,
- Southern University and A&M College,
- Southern University of New Orleans,
- Spelman College,
- SUNY Oswego,
- Texas Southern University,
- Tulane University,
- University of Alabama,
- University of Arkansas at Pine Bluff,
- University of California at Riverside,
- University of California at Santa Barbara,
- University of Florida,
- University of South Carolina,
- University of Texas at Arlington,
- University of the District of Columbia,
- Virginia Commonwealth University,
- Wesleyan University,
- West Virginia University,
- Xavier University of Louisiana, and
- York University.

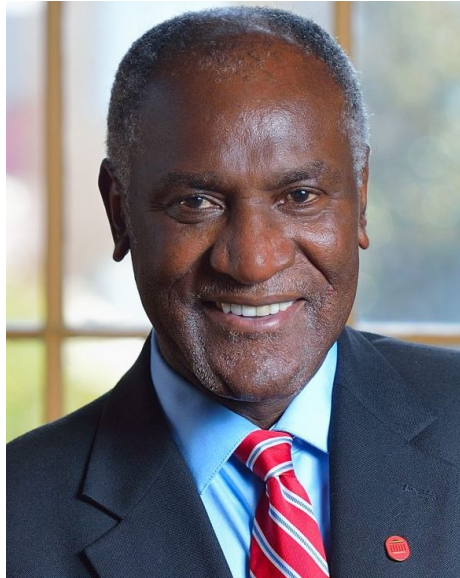
Over the next few days, you'll have the opportunity to meet people from HBCUs, HSIs, PWIs, Research I Universities, and Liberal Arts Colleges. (If you don't know what any of these mean, this is a hint to use this conference to find out . . .) You'll have the opportunity to learn some interesting mathematics, hear some great talks, and solve some challenging problems.

We are especially grateful for support from Rachid Belmasrou (SUNO), Naiomi Cameron (Spelman College), Phyllis Okwan (SUBR), Joe Omojola (SUNO), and Cynthia Singleton (SUNO). for assisting with the planning and organizing. If you see them around, be sure to thank them as well.

Enjoy MATHFest!

Edray Herber Goins
President, National Association of Mathematicians, Inc.

J. Ernest Wilkins Lecture



Donald R. Cole

Assistant Provost, Assistant to the Chancellor for Multicultural Affairs,
and Associate Professor of Mathematics at the University of Mississippi

Squaring the Circle

Dr. Donald R. Cole was born and raised in Jackson, Mississippi. Growing up in the civil rights era of the South, he chose the recently integrated University of Mississippi (UM) to begin his college career. He was pleased that his high school preparation served him well as he accelerated in his mathematics classes, but the racial climate of the era soon resulted in his expulsion from UM for participation in racial protesting of the day. Tougaloo College extended an opportunity for him to be able to complete his bachelors with a dual major in Mathematics and Physics. Dr. Cole took a masters degree from the University of Michigan before moving on to the State University of New York at Buffalo to pursue his doctorate. Dr. Cole made a critical decision in life when he decided to return to the University of Mississippi to complete his doctorate.

Dr. Cole began his working career in the aerospace industry where he made mathematical contributions to a number of systems on the F-16 Program before returning to academia by joining the mathematics faculty at Florida A&M University. There he and his colleague, Dr. Roselyn Williams, inspired a generation of young mathematicians to pursue graduate degrees in the mathematical sciences. In 1993 Dr. Cole practically “squared the circle” when he accepted an invitation to return to the University of Mississippi as an administrator and Associate Professor in Mathematics. In his career at UM, he has served as Associate Dean of the Graduate School, Assistant Provost, Assistant to the Chancellor for Multicultural Affairs, Associate Professor of Mathematics, and a member of the Chancellor’s Executive Staff.

Learn more by visiting <http://mathematicallygiftedandblack.com/honorees/donald-ray-cole/>



Jesse Ernest Wilkins, Jr.

The **J. Ernest Wilkins Lecture** series was inaugurated in 1994 during NAM’s Undergraduate MATHFest IV at North Carolina A&T. It is named in honor of Jesse Ernest Wilkins, Jr. (November 27, 1923 – May 12, 2011), an internationally recognized nuclear scientist, mechanical engineer and mathematician.

J. Ernest Wilkins was known in the press as the “Negro Genius.” Wilkins received his B.S. degree as a Phi Beta Kappa graduate at the age of 16, his M.S. degree at age 17, and his Ph.D. degree at the age of 19. Although he has been highly praised as a superb practitioner of his crafts, Wilkins is also widely recognized and acclaimed as a highly productive scholar, having published more than 80 journal articles and having produced an additional 22 unpublished reports for the Atomic Energy Commission. Wilkins is the only African American mathematician-engineer elected as a Fellow to the National Academy of Engineering (NAE).

The inaugural lecture was given by Wilkins himself. The Lecture is to be given annually at the Undergraduate MATHFest, a conference for which Wilkins was a frequent attendee.

Conference Schedule

All activities will be held in the University Conference Center at Southern University of New Orleans (6400 Press Drive, New Orleans, LA 70126); except for the Recognition Banquet which will be held at the New Orleans Marriott (555 Canal Street, New Orleans, LA 70130).

Friday, September 27	
1:00 PM – 4:00 PM University Conference Center	On-Site Registration
1:00 PM – 1:30 PM New Orleans Marriott	Bus Leaves New Orleans Marriott for Southern University with Limousine Livery
2:00 PM – 2:30 PM University Conference Center	Greetings and Conference Orientation Dr. Naiomi Cameron, Vice-President of NAM Dr. Edray Herber Goins, President of NAM Dr. Joe Omojola, Professor of Mathematics and Physics, SUNO Dr. Carl P. Johnson, Chair of the Department of Natural Sciences, SUNO Dr. Evelyn Harrell, Dean of the College of Arts and Sciences, SUNO
AFTERNOON SESSION	Moderator: Julian Apelete Allagan (Elizabeth City State University)
2:30 PM – 3:00 PM University Conference Center	<i>Using Calendar Correlation to Increase Investment Efficiency</i> Andrea Gibson (Southern University at New Orleans) and Joe Omojola (Southern University of New Orleans)
3:00 PM – 3:30 PM University Conference Center	<i>Estimating the Parameters of Linear Regression Models using User-Defined Functions in R</i> Janei Elliston (Florida A&M University)
3:30 PM – 4:00 PM University Conference Center	Beverage Break Catered by SUNO Catering
4:00 PM – 5:00 PM University Conference Center	J. Ernest Wilkins Lecture <i>Squaring the Circle</i> Donald Cole (University of Mississippi) Introduction by Roselyn Williams (Florida A&M University)
5:30 PM – 7:00 PM University Conference Center	Reception Catered by SUNO Catering Sponsored by the Mathematical Sciences Institutes Diversity Initiative (MSIDI)
7:00 PM – 7:30 PM University Conference Center	Bus Returns to New Orleans Marriott with Limousine Livery

Saturday, September 28	
7:30 AM – 8:00 AM New Orleans Marriott	Bus Leaves New Orleans Marriott for Southern University with Limousine Livery
8:00 AM – 9:00 AM University Conference Center	Continental Breakfast Catered by SUNO Catering
8:00 AM – 12:00 PM University Conference Center	On-Site Registration
MORNING SESSION	Moderator: Helen Grundman (Bryn Mawr College)
9:00 AM – 9:30 AM University Conference Center	<i>A & Z Sequences for Double Riordan Arrays</i> Donovan Branch (Morehouse College), Jazmin Jones (Clark Atlanta University), and Geoffrey Thorpe (Morehouse College)
9:30 AM – 10:00 AM University Conference Center	<i>Incorporation of BlenderGIS into FDS Modeling Workflow</i> Zynyl Castor (University of the District of Columbia)
10:00 AM – 10:30 AM University Conference Center	Beverage Break Catered by SUNO Catering
10:30 AM – 11:00 AM University Conference Center	<i>Minimal Discriminants of Rational Elliptic Curves with Specified Isogeny</i> Alvaro Cornejo (University of California at Santa Barbara)
11:00 AM – 11:30 AM University Conference Center	<i>Graduate Fellowships in a Nutshell</i> Erick Jones (University of Texas at Arlington)
11:30 AM – 12:00 PM University Conference Center	Problem Time with Dr. Cooper Round 1 of 3 Duane Cooper (Morehouse College)
12:00 PM – 1:00 PM University Conference Center	Lunch Catered by SUNO Catering

Saturday, September 28	
AFTERNOON SESSION	Moderator: Widodo Samyono (Jarvis Christian College)
1:00 PM – 1:30 PM University Conference Center	<i>A Comparison Analysis of the Triangle Functions and the 3rd Roots of Unity</i> Jasmine Brown (Clark Atlanta University)
1:30 PM – 2:00 PM University Conference Center	<i>The Endgame: An Analysis of Chess as an Introduction to Machine Learning</i> Myka Terry (Morgan State University)
2:00 PM – 3:00 PM University Conference Center	Panel: <i>Applying to Graduate School</i> Berlinda Batista (Howard University) Daniel Collister (University of California at Riverside) Quindel Jones (Virginia Commonwealth University) Dwight Williams (University of Texas at Arlington), Moderator
2:00 PM – 3:00 PM Natural Science Auditorium NSB 103	NSF Funding Opportunities for HBCU Faculty Talitha Washington (National Science Foundation)
3:00 PM – 3:30 PM University Conference Center	Problem Time with Dr. Cooper Round 2 of 3 Duane Cooper (Morehouse College)
3:30 PM – 4:00 PM University Library Seminar Room 2, 3, and 4	Group Photo Beverage Break Graduate Fair and Poster Set-Up
4:00 PM – 5:00 PM University Library Seminar Room 2, 3, and 4	Graduate Fair / Poster Session Poster Presentation Judges: Thir Dangal (Alcorn State University) Kimyata Dilworth (Southern University and A&M College at Baton Rouge) Balaram Ghimire (Alabama State University) Donna Newman Taylor (Southern University and A&M College at Baton Rouge)
5:30 PM – 6:00 PM University Conference Center	Bus Returns to New Orleans Marriott with Limousine Livery
7:00 PM – 9:00 PM New Orleans Marriott	Undergraduate MATHFest XXIX Appreciation Dinner Invocation by Johnny Houston (Elizabeth City State University)

Sunday, September 29	
7:30 AM – 8:00 AM New Orleans Marriott	Bus Leaves New Orleans Marriott for Southern University with Limousine Livery
8:00 AM – 9:00 AM University Conference Center	Continental Breakfast Catered by SUNO Catering
MORNING SESSION	Moderator: Joan Evans (Texas Southern University)
9:00 AM – 9:30 AM University Conference Center	<i>Towards a Database of Belyř Maps</i> Myles Ashitey (Pomona College) and Brian Bishop (Pomona College)
9:30 AM – 10:30 AM University Conference Center	Panel: <i>The Next Step: REUs and Internships</i> Duane Cooper (Morehouse College) Michael Young (Iowa State University) Kun Zhao (Tulane University) Leona Harris (University of the District of Columbia), Moderator
10:30 AM – 11:00 AM University Conference Center	Problem Time with Dr. Cooper Round 3 of 3 Duane Cooper (Morehouse College)
11:00 AM – 11:30 AM University Conference Center	Beverage Break Judges Tally Scores
11:30 AM – 11:45 AM University Conference Center	Awards Ceremony Oral Presentation Judges: Katrina Cunningham (Southern University and A&M College at Baton Rouge) Kenneth Jones (Elizabeth City State University) Tiffany Vappie (Southern University and A&M College at Baton Rouge) Karl Walker (University of Arkansas at Pine Bluff)
11:45 AM – 12:00 PM University Conference Center	Closing Remarks Dr. Edray Herber Goins, President of NAM Ms. Gloria B. Moultrie, Vice Chancellor for Outreach/University Advancement (SUNO)
12:00 PM – 1:00 PM University Conference Center	Lunch Catered by SUNO Catering
1:00 PM – 1:30 PM University Conference Center	Bus Returns to New Orleans Marriott / New Orleans Airport with Limousine Livery

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Oral Presentation Abstracts

1. Myles Ashitey (Pomona College) and Brian Bishop (Pomona College)

Towards a Database of Belyĭ Maps

Sunday from 9:00 AM - 9:30 AM

A Belyĭ map $\beta : \mathbb{P}^1(\mathbb{C}) \rightarrow \mathbb{P}^1(\mathbb{C})$ is a rational function with at most three critical values; we may assume these are $\{0, 1, \infty\}$. A Dessin d'Enfant is a planar bipartite graph on the sphere obtained by considering the preimage of a path between two of these critical values, usually taken to be the line segment from 0 to 1. Such graphs can be drawn on the sphere by composing with stereographic projection: $\beta^{-1}([0, 1]) \subseteq \mathbb{P}^1(\mathbb{C}) \simeq S^2(\mathbb{R})$. This project sought to either create or expand on a database of such Belyĭ pairs, their corresponding Dessins d'Enfant, and their monodromy groups. We did so for up to degree $N = 5$ in the hopes of generating an algorithm to generate Dessins from monodromy triples.

2. Donovan Branch (Morehouse College), Jazmin Jones (Clark Atlanta University), and Geoffrey Thorpe (Morehouse College)

A \mathcal{E} Z Sequences for Double Riordan Arrays

Saturday from 9:00 AM - 9:30 AM

A Riordan array is an infinite lower triangular matrix that is defined by two generating functions, g and f . The coefficients of the generating function g gives the first column and the n^{th} column of the matrix is defined by the generating function gf^n . We shall call f the multiplier function. Similarly, a Double Riordan array is an infinite lower triangular matrix that is defined by three generating functions, g , f_1 and f_2 . Where the zeroth column of the Double Riordan array is g , the next column is given by gf_1 and the following column will be defined by gf_1f_2 . The remaining columns are found by multiplying f_1 and f_2 alternatively. Thus, for a double Riordan array there are two multiplier functions, f_1 and f_2 . It is known that the Riordan array only has one Z -sequence and one A -sequence. This is not the case for Double Riordan arrays. We show that double Riordan arrays have two Z -sequences and one A -sequence. The set of double Riordan arrays form a group under matrix multiplication. In our research we also found some new subgroups in the Double Riordan group.

3. Jasmine Brown (Clark Atlanta University)

A Comparison Analysis of the Triangle Functions and the 3rd Roots of Unity

Saturday from 1:00 PM - 1:30 PM

A circle is defined as a collection of points (x, y) that are equidistant from a fixed center point. If θ is an angle in standard position, (x, y) is a point on the terminal side of θ , and r is the radius of the circle, then the circular functions are $\sin \theta = \frac{y}{r}$ and $\cos \theta = \frac{x}{r}$. Suppose we inscribe a regular triangle with $n = 3$ vertices inside of a unit circle where the first vertex is $(1, 0)$. Thus, the remaining vertices of the triangle are $(-\frac{1}{2}, \frac{\sqrt{3}}{2})$ and $(-\frac{1}{2}, -\frac{\sqrt{3}}{2})$. Each pair of adjacent vertices of the triangle are an equidistant apart with a central angle that measures $\frac{2\pi}{3}$ radians. The elements of the set $U_n = \{z \in \mathbb{C} | z^n = 1\}$ are called the n^{th} roots of unity. In this research we, we write the solutions that satisfy the equation $z^3 = 1$ and find the piece-wise equations for the triangular functions. The plots of the triangle functions are constructed, and the three roots of unity are annotated. Further analysis of the triangle functions and the solutions of the 3^{rd} roots of unity are captured.

4. Zynyl Castor (University of the District of Columbia)

Incorporation of BlenderGIS into FDS Modeling Workflow

Saturday from 9:30 AM - 10:00 AM

The Fire Dynamics Simulator (FDS) is an open source computational fluid dynamics (CFD) model of fire-driven fluid flow. NIST and its collaborators have produced validation cases to ensure that FDS produces reliable results. FDS takes parameters from an input file. When complex geometry is needed it is convenient to make use of third-party tools to generate the input file parameters. Emanuele Gissi, a collaborator in Italy, has written an add-on to Blender (a 3D modeling/animation software) called BlenderFDS which, in conjunction with another Blender add-on called BlenderGIS (Geographic Information System), enables FDS users to build cases around terrain data easily. For this summer, we are focusing on wind flow around Askervein Hill in order to validate FDS for outdoor wind fields relevant for wildland fire spread modeling. Importing terrain data with BlenderGIS, building the necessary geometries for FDS using BlenderFDS, and finally exporting the FDS input file are the first steps in setting up the validation case. However, further work, such as running the model

and analyzing the output, is needed in order to complete the validation study. BlenderFDS and BlenderGIS are significant improvements to terrain input, allowing FDS users to incorporate more complicated datasets. However, several issues remain, including details of vegetation type, soil moisture content, and ignition source data that will be required for accurate wildland fire spread modeling.

5. Donald Cole (University of Mississippi)

Squaring the Circle

Friday from 4:00 PM - 5:00 PM

“The Squaring of the Circle” is a phrase used to describe one of the famous “unsolvable” Greek problems of antiquity. This talk will give precise meaning to this famous problem, introduce the audience to other famous Greek problems and use a non-Euclidean geometry to render a related version of this problem. The talk will conclude with motivational aspects of pursuing a graduate degree in the mathematical sciences.

6. Alvaro Cornejo (University of California at Santa Barbara)

Minimal Discriminants of Rational Elliptic Curves with Specified Isogeny

Saturday from 10:30 AM - 11:00 AM

By a rational elliptic curve, we mean a projective variety of genus 1 that admits a Weierstrass model of the form $y^2 = x^2 + Ax + B$ where A and B are integers. For a rational elliptic curve E , there is a unique quantity known as the minimal discriminant which has the property that it is the smallest integer (in absolute value) occurring in the \mathbb{Q} -isomorphism class of E . In 1975, Hellegouarch showed that the elliptic curve $y^2 = x(x+a)(x-b)$ for relatively prime integers a and b comes equipped with an easily computable minimal discriminant. Recently, Barrios extended this result to all rational elliptic curves with non-trivial torsion subgroup. This project gives a classification of minimal discriminant for rational elliptic curves that admit an isogeny of degree $N \geq 2$. This work is part of PRiME (Pomona Research in Mathematics Experience) with assistance by Alex Barrios and Timothy McEldowney. This work was sponsored by the National Science Foundation (DMS-1560394).

7. Janei Elliston (Florida A&M University)

Estimating the Parameters of Linear Regression Models using User-Defined Functions in R

Friday from 3:00 PM - 3:30 PM

The study of Linear Regression is a well-worked area. It is very common that for parametric models, Least Square Estimates and Maximum Likelihood Estimates are asymptotically equivalent. R is both a programming and statistical language that can be used for data analytics and visualization. This research entailed writing a function in R, using RStudio, to compute Least Square Estimates by using Calculus to optimize the log likelihood function. By making an educated guess of the ranges of the regression parameters and creating a grid, a function was also written to compute the Maximum Likelihood Estimates.

8. Andrea Gibson (Southern University at New Orleans) and Joe Omojola (Southern University of New Orleans)

Using Calendar Correlation to Increase Investment Efficiency

Friday from 2:30 PM - 3:00 PM

Correlation is a statistical measure that determines the level of relationship between two variables. The goal of this research is to determine calendar periods over which a trend in a particular stock correlate with each other and the frequency of their correlation. The objectives of this research are: (a) to collect data for assigned stocks and analyze the data, (b) to determine the trends (up or down) and their respective time frame and, (c) to determine time intervals over 10 years when trends in the same stock agree. Data was collected for a period of 10 years for 25 assigned stocks. Specifically, the period for up trends and down trends were determined for 10 years. The success rates of the up trends and down trends were then determined. They were determined by looking at the stock charts for the years 2008-2017 and recording all the up and down trends throughout those years. Then, looking at those trends one can determine if the dates of those trends correlate. Majority had a positive correlation while a few had a negative correlation. However, negative correlations can be used for buying put options. To test how accurate the research was, the year 2018 was used to determine if those predictions were accurate. In conclusion, the result show that one can determine the periods over which stock prices trends correlate and be able to use this knowledge to make profitable investment decisions. On average the predictions are about 49% accurate.

9. Erick Jones (University of Texas at Arlington)

Graduate Fellowships in a Nutshell

Saturday from 11:00 AM - 11:30 AM

In this talk, we will discuss how to develop applications for graduate school funding.

10. Myka Terry (Morgan State University)

The Endgame: An Analysis of Chess as an Introduction to Machine Learning

Saturday from 1:30 PM - 2:00 PM

Reconnaissance Chess (ReconChess) is a form of chess that differs from the classical game in many ways. The main difference between the two is that a player no longer has the ability to view the moves of his/her opponent. Instead, each turn starts by selecting a 3×3 section (or flash) of the board to be updated. Reconnaissance Chess has three different built-in bots; they have no deductive abilities. As a result, the bots are unable to make inferences about the previous location of the chess pieces in the updated area. This creates an uncertainty factor which has an affect on the traditional rules and regulations of the classical game of chess. (It allows for illegal moves, removes the concepts of check and checkmate, etc.) For this project, we looked for trends in the moves of two of the bots and developed a new bot with deductive capabilities. We used the python environment to play the game and develop the new bot. The new bot is able to access past data and use it make inferences about the current board. By doing so, we are giving the bot the power to take an incomplete picture and intelligently fill in the blanks. This process has many applications to machine learning.

11. Talitha Washington (National Science Foundation)

NSF Funding Opportunities for HBCU Faculty

Saturday from 2:00 PM - 3:00 PM

In this presentation, we will discuss various funding opportunities at the National Science Foundation. In particular, we will review the funding programs in the Division of Undergraduate Education (DUE).

Poster Abstracts

1. Abdul-Haqq Agness (Los Angeles Community College District)

Five Colorable Knots

We have been conducting research on a knot invariant called 5-colorability. From a paper published 10 years ago, we know that any 5 colorable knot can be colored using 4 colors by eliminating the color zero. We proved that actually any one of the 5 colors can be eliminated.

2. Alexander Collado (Pomona College)

Structural Identifiability of Nonlinear Glucose-Insulin Models

The concept of structural identifiability was introduced by Bellman and Åström in 1970. Structural Identifiability refers to the theoretical possibility of determining the parameter values of a system from observations of its output. Many complex biological processes can be described by systems of nonlinear ordinary differential equations and can be analyzed by this approach. This poster serves as a tutorial on structural identifiability and its possible issues in the 'βIG model' of the glucose-insulin system.

3. Jackson Douglas (Xavier University)

A Study of Generalized Q Matrices

Q Matrices are derived from extensively studying the Fibonacci sequence and its properties, and analyzing them from a linear algebra perspective. This study takes the properties of the basic 2×2 Q matrix and attempts to analyze an extension of these properties by analyzing extended forms of the original Fibonacci sequence, known as Fibonacci p -numbers/sequences. One of several possible applications of the information found in this study is a coding theory that would allow for a more efficient method of source coding. This method allows for increasing a source code's ability to detect and correct errors, which is very important especially when discussing codes that help with transferring important information, like bank information.

4. Adriana Fernandez (Xavier University)

A Study of Exponential Cipher

RSA is one of the most secure systems to safe personal data and it has a lot to do with online signature. In this presentation we are going to explain how RSA Algorithms are created using basic enciphering processes and we are going to introduce Euler's Phi Function, all while explaining why it is so important for the security of the RSA Algorithm.

5. Juliann Geraci (State University of New York at Oswego)

The Hidden Information in Infinite Series Arising from Graphs

Letting h_n denote the number of walks of length n in a directed graph G , we study the infinite sequence of numbers $h = (h_0, h_1, h_2, \dots)$, and how properties of G are encoded in its growth. To extract information from h , we will study its generating function $H(t) = \sum_{n \geq 0} h_n t^n$. We will show that $H(t)$ coincides with a rational function $f(t)$, and that properties of G (e.g., the number and lengths of oriented cycles in G influence the form of $f(t)$).

6. Zakiyah Jones (Pomona College)

Parking Functions: Naples and Beyond. Relating k -Naples Parking Functions to Decreasing Lattice Paths

Naples parking functions were first introduced by Baumgardener. A natural generalization of Naples parking functions are parking functions that allow cars to take up to k steps back if their preferred spot is occupied, k -Naples parking functions. There is a well-known bijection between regular parking functions and Dyck paths. In this poster, we explore connections between k -Naples parking functions and decreasing Dyck paths, or k -Naples Lattice Paths.

7. Rohan Lopez (Pomona College)

Center for Nuclear Study 2019

In this project, we measured and analyzed data correlating to the scattering angles of protons in interaction with a gold nucleus. We experimented with different preamplifier electrical configurations to determine the best reading for detecting alpha particle emission. Additionally, we wrote Python script to model the scattering of protons off of a gold target with variable angles while studying R-Matrix theory code for resonance of nuclei identification using differential cross-sections.

8. Rolanda Warren (Southern University of New Orleans)

Preparing PK-12 Students for Computer Science Literacy

The Office of Educational Programs (OEP) at Brookhaven National Laboratory (BNL) allowed me the opportunity to teach students how to use the Amazon Elastic Compute Cloud. The Amazon Elastic Compute Cloud provided students with access to virtual machines to learn to program using a Linux operating system. I was able to learn about programming and identify a need for innovative, evolving professions that can be beneficial to students in under-resourced schools. Teaching computer science offers opportunities for students to embark on an evolving market. It also provides school districts the chance to give students a lead towards their future occupation, while also correlating with State Standards. Computer Science in under-resourced PK-12 is uncommon. Additionally, it is also rare for non-advanced placement students in enriched schools to be able to take computer science courses. Exposure to computer science in primary and early secondary grades could be more beneficial than waiting until the usual time in high school. After years of exposure to computer science, students would then be able to take more advanced courses in computational thinking, allowing them to develop impactful skills with software and software systems.

9. Marquia Williams (State University of New York at Oswego)

The Art of Tiling and Generating Functions

Throughout the summer of 2018 I worked on developing a generating function for the number of ways to tile a 4 by k grid with 2 by 1 dominoes. The first thing I did was count by hand the number of ways to tile a 4 by 1 , 4 by 2 and 4 by 3 grid. Though unsuccessful at producing a direct formula, I came up with a recursive formula. After studying generating functions, I was able to derive a generating function for my question. My goal is to use the generating function to solve for a direct formula.

10. Mack Williams (Xavier University)

Integrating THUNDER Particle-Filter Framework for Robust Cryo-EM 3D Reconstruction to Gateway

TBA

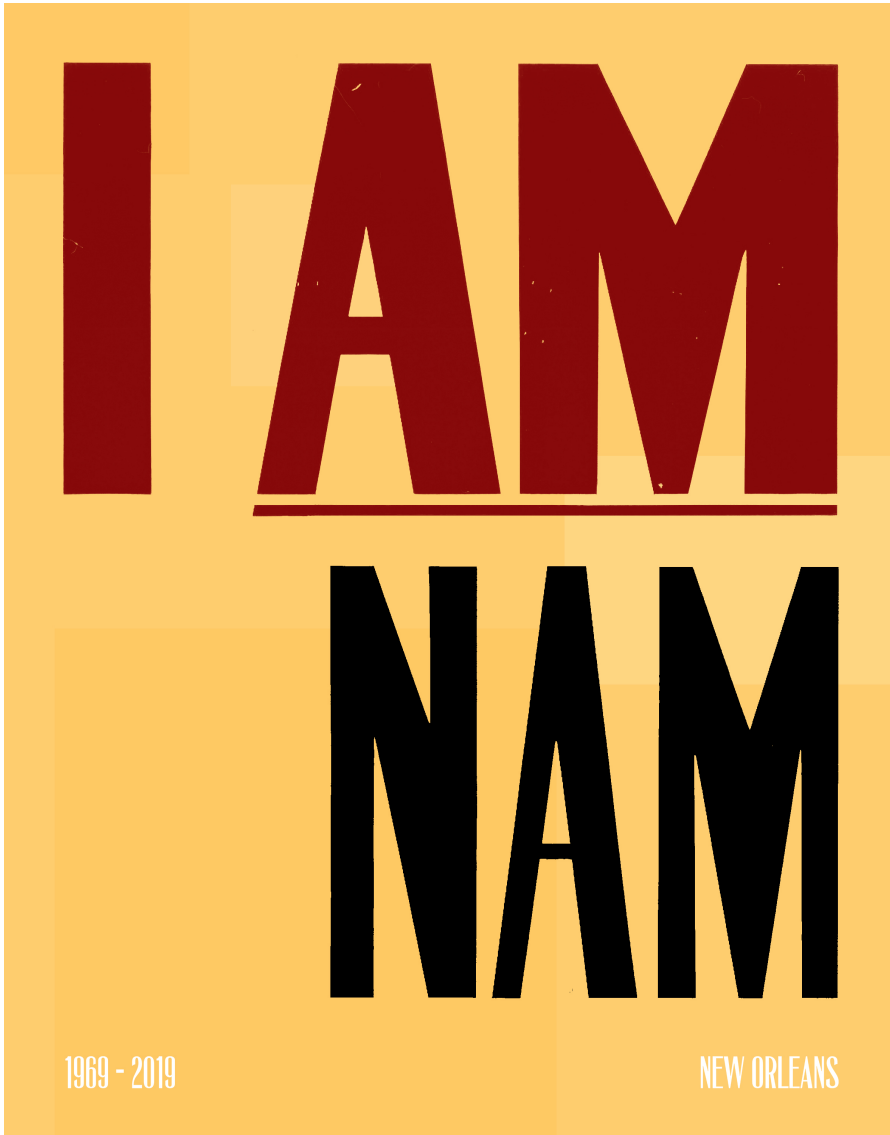
11. Raven Williams (Southern University of New Orleans)

Determination of the effect of Charter Schools on School Achievement

Charter schools are independently-operated and tuition free schools. Since Hurricane Katrina in 2005, the number of charter schools in Orleans Parish School Board (OPSB) has increased from four (4) to eighty-one. The goal of this research is to determine the effect of charter schools on performance of OPSB schools. Data for the school performance scores was collected from LouisianaBelieve.com under measuring results. This data contains K-12 Assessments, Student and Early Childhood Center Performance, and Tools to Support Assessments for Orleans Parish school system from 2000 to 2018. The first test we ran was Kolmogorov Smirnov (K-S) test for normality of the school performance scores. A Two-Sample T-test, was ran to determine if there was a difference between two population means. In addition, we ran Wilcoxon test which is nonparametric alternative to two-sample t-test that focus on the ranking of the school scores. Results for 50 charter school performance scores show that: (a) the data was normally distributed, (b) after Katrina the school performance scores improved compared to before, (c) the Wilcoxon test confirmed the results of the t-test. In conclusion, this research showed that the charter schools did have a positive and negative impact on the performance of New Orleans public school system.

Previous NAM Undergraduate MATHFests

- MATHFest XXIX: September 27 - 29, 2019 at Southern University (Region A)
- MATHFest XXVIII: September 28 - 30, 2018 at Spelman College (Region A)
- MATHFest XXVII: September 29 - October 1, 2017 at Medgar Evers College (Region B)
- MATHFest XXVI: November 10-12, 2016 at Morgan State University (Region B)
- MATHFest XXV: October 29-31, 2015 at Morgan State University (Region B)
- MATHFest XXIV: Cancelled
- MATHFest XXIII: November 8-9, 2013 at Texas State University (Region C)
- MATHFest XXII: November 1-3, 2012 at Morgan State University (Region B)
- MATHFest XXI: November 3-5, 2011 at Dillard University (Region C)
- MATHFest XX: November 18-20, 2010 at Miami Dade College (Region A)
- MATHFest XIX: November 12-14, 2009 at the University of District of Columbia (Region B)
- MATHFest XVIII: November 13-15, 2008 at Texas Southern University (Region C)
- MATHFest XVII: November 8-10, 2007 at Spelman College (Region A)
- MATHFest XVI: November 9-11, 2006 at Howard University (Region B)
- MATHFest XV: November 10-12, 2005 at Texas Southern University (Region C)
- MATHFest XIV: October 7-9, 2004 at Morehouse College (Region A)
- MATHFest XIII: October 20 - November 1, 2003 at Delaware Statue University (Region B)
- MATHFest XII: October 2002 at Southern University of New Orleans (Region C)
- MATHFest XI: October 4-6, 2001 at Florida A&M (Region A)
- MATHFest X: October 26-28, 2000 at Morgan State University (Region B)
- MATHFest IX: October 21-23, 1999 at Texas Southern University (Region C)
- MATHFest VIII: October 21-23, 1998 at Benedict College (Region A)
- MATHFest VII: October 23-25, 1997 at Elizabeth City State University (Region B)
- MATHFest VI: October 24-26, 1996 at Xavier University (Region C)
- MATHFest V: October 26-28, 1995 at Clark Atlanta (Region A)
- MATHFest IV: October 13-15, 1994 at North Carolina A&T (Region B)
- MATHFest III: October 21-23, 1993 at Southern University (Region C)
- MATHFest II: March 18-20, 1993 at Spelman College (Region A)
- MATHFest I: November 1991 at Hampton University (Region B)



Golden Anniversary 2019



Founded 1969

**NAM Undergraduate MATHFest XXIX
Southern University of New Orleans
September 27-29, 2019**

National Association of Mathematicians, Inc. Undergraduate MATHFest XXIX



Friday, September 27 - Sunday, September 29
Southern University of New Orleans

NAM's Undergraduate MATHFest is a three-day meeting which rotates around the country based on NAM's regional structure. It is held annually to encourage students to pursue advanced degrees in mathematics and mathematics education. The conference is geared for undergraduates from Historically Black Colleges and Universities (HBCUs), although all are welcome to attend. The conference consists of five components:

Student Talks

There will be ten talks given by undergraduate and graduate students which last 30-minutes each.

Poster Presentations

Students have the opportunity to present posters outlining their research.

Graduate Fair

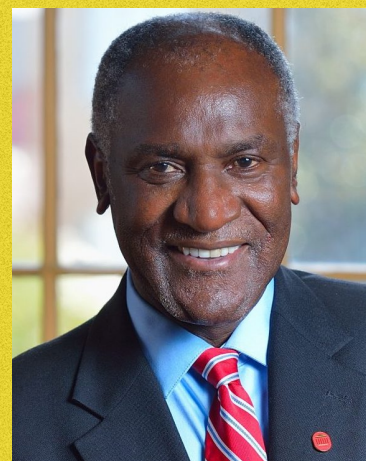
Universities will have an opportunity to showcase their graduate programs and interact with undergraduate students in a one-hour fair.

Problem Time with Dr. Cooper

Throughout the conference, students will be presented challenge problems. Students with correct solutions will be presented prizes.

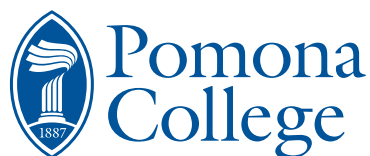
The J. Ernest Wilkins Lecture

This is an hour-long talk, given by an established researcher, to motivate our undergraduates to continue to pursue research in the mathematical sciences.



2019 J. Ernest Wilkins Lecture
Donald Cole
Associate Professor of Mathematics

Funding is available for travel. To apply for funding, visit the conference website below; the deadline is Monday, September 9, 2019.



Golden Anniversary 2019



Founded 1969

<http://www.nam-math.org/mathfest.html#XXIX>

Sudoku Puzzle

Fill in the grid with digits in such a manner that every row, every column and every 3x3 box accommodates the digits 1-9, without repeating any.

6	2			5				
8	3			7		9	4	2
			8		2		3	
2		4		6		8		3
					8			9
	8	6		3	7		2	
	9			2	1	3		6
3	6		9		5			4
	5						9	

	1	5		8	2			9
	7		5		9			1
2							5	6
	4	2		9				7
7								2
6			2	1	7		4	3
9			7					8
1	5		8		6		9	
4				3		7	6	

	9	6		4	7	5		
8			9	6			3	
2						4		6
4		5	7	9			8	3
7	3		4			1		2
				5				
	7	4	8	2			6	1
	8	3			4			
			6			8	4	

	6	3	8			1	2	
			3		9			7
	5	8		4		9		
		5			7	4		6
	4	7		8	3	2	9	
3			2					
	3		7	9		5	4	
2	8				1		7	
	7		4				8	

PUZZLES and BRAINS

6 BY 6 MATHDOKU (MEDIUM NO. 1 AND 2)

FILL THE GRID WITH THE NUMBERS 1 TO 6 IN SUCH THAT EACH NUMBER APPEARS ONLY ONCE IN EACH ROW AND COLUMN. THE MATHDOKU GRID IS ALSO DIVIDED IN OUTLINED REGIONS CALLED CAGES EACH WITH A GIVEN OPERATOR AND TARGET NUMBER. THE NUMBERS IN THE INDIVIDUAL CELLS OF A CAGE MUST PRODUCE THAT TARGET NUMBER USING THE OPERATOR IN A MATHEMATICAL CALCULATION.

10+	6+	11+		12×	15×
		9+			
	3-			10×	
9+	15×		4÷	3÷	
		10+		6÷	5+
11+					

0606 MATHDOKU MEDIUM 1

3÷		2-		2÷	120×
18×	5÷	2-			
		6×	7+		
20×	5+		4÷		
		5×		11+	
11+			2-		

0606 MATHDOKU MEDIUM 2

Name: _____

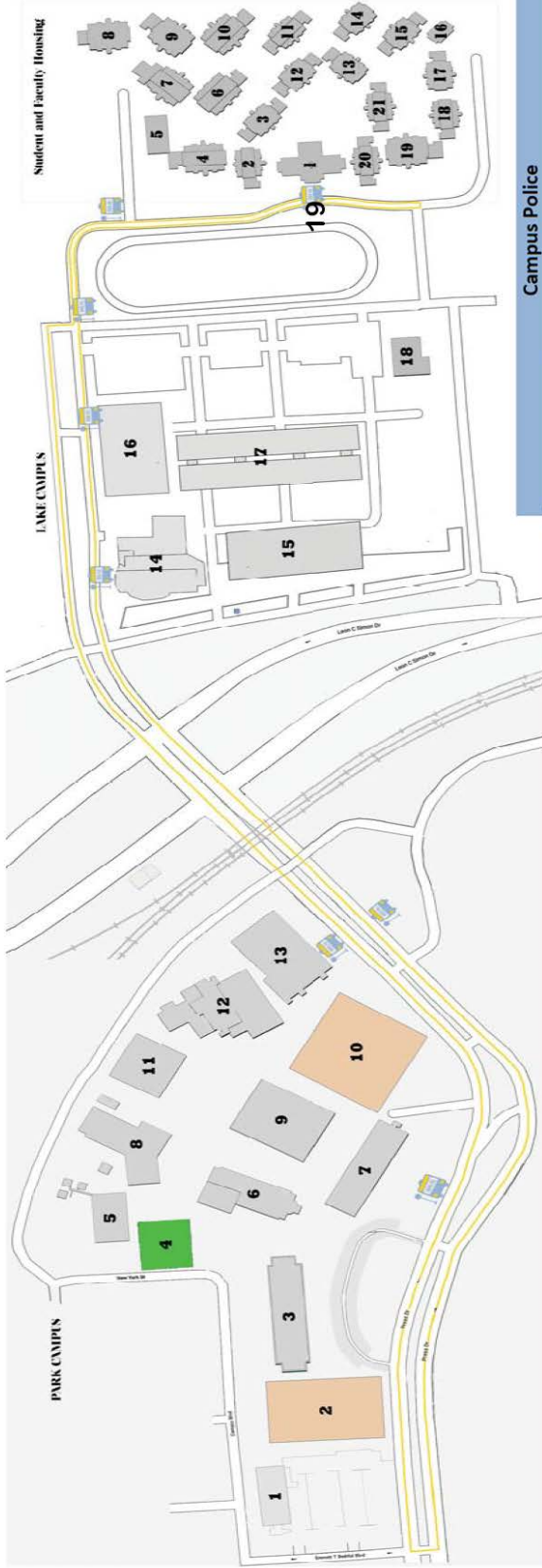
Human Scavenger Hunt!

Get to Know Your New Buddies

Has been out of the country: _____	Has a pet that isn't a dog or a cat: _____	LOVES SCIENCE: _____	Favorite subject is math: _____
Had a birthday within the last week: _____	Has visited Washington, D.C. _____	Has a brother or a sister that goes to this school: _____	loves to cook: _____
PLAYS A SPORT: _____	Favorite color is yellow: _____	Was born in another state: _____	Read more than 1 book this summer: _____
LOVES TO DRAW OR PAINT: _____	Has met someone famous _____	Has won a contest of some kind: _____	plays an instrument: _____
Has done something adventurous: _____	is an only child _____	Loves Broccoli _____	Has been to the Statue of Liberty: _____

SOUTHERN UNIVERSITY at NEW ORLEANS

6400 Press Drive, New Orleans, Louisiana 70126



Park Campus

1. Conference Center
2. Natural Sciences Building
3. New Science Building
4. Tennis Courts
5. Central Plant
6. Old Science Building (Brown Hall)
7. Emmett W. Bashful Administration Building
8. Maintenance Building
9. Leonard S. Washington Memorial Library
10. Arts, Humanities and Social Sciences Building
11. Cafeteria (Knight's Dining Hall)
12. University Center
13. University Gymnasium

Lake Campus

14. College of Business & Public Administration
15. College of Education & Human Development
16. Mille M. Charles School of Social Work
17. Multipurpose Complex (Modular Building)
18. Information Technology Center
19. Housing

Last updated on August 6, 2019



SUNO Shuttle Bus Route

Campus Police

For general information and non-emergencies: 504-286-5291
For emergencies: Call 911

Departments / Schools Phone Extensions

African American Studies Center	5006	Graduate Studies	5484
Arts & Humanities	5154	Health Info Management	5083
Business	5331	Natural Sciences	5245
Education	5351	Social Sciences	5478
General Studies	5484	Social Work	5376

Other Units' Phone Extensions

Admissions	5235	ITC / Helpdesk	5237
Athletics	5197	Registrar	5175
Bookstore	5324	SGA	5358
Cafeteria	5317	Student Activities	5388
Cafeteria Menu	5301	Student Development	5360
Cashiers	5322	Student Support	5108
Community Outreach	5341	Services / TRIO	5108
Comprehensive	5026	Students w/Disabilities	5335
Communications Center	5321	Talent Search	5445
Comptrollers	5263	Title III	5274
Financial Aid	5422	Upward Bound	5280
Grants	5374	Veterans Affairs	5389
Health Services	5395	Housing	