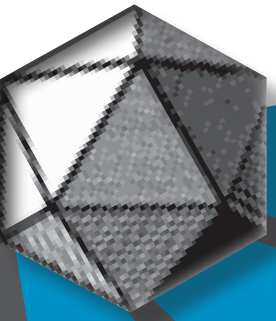
THE MATHEMATICAL ASSOCIATION OF AMERICA

ANNUAL MEETING OF

THE METROPOLITAN NEW YORK SECTION

Saturday, May 1, 2010 8:00 AM - 5:00 PM

New York City College of Technology, CUNY, Brooklyn, New York



ANNUAL MEETING OF THE METROPOLITAN NEW YORK SECTION
OF THE
MATHEMATICAL ASSOCIATION OF AMERICA
NEW YORK CITY COLLEGE OF TECHNOLOGY, CUNY

MAY 1, 2010

8:00 - 9:00 AM	Registration Refreshments Book Exhibits	Atrium Amphitheater Atrium Lounge
9:00 - 9:15 AM	Welcoming remarks: Pamela Brown Dean of the School of Arts & Sciences New York City College of Technology, CUNY Farley Mawyer Chair, Metropolitan New York Section of the MAA	Atrium Amphitheater
9:15 - 10:15 AM	*The Frobenius Problem and Its Generalizations* Jeffrey O. Shallit University of Waterloo	Atrium Amphitheater
10:15 - 10:30 AM	Break	
10:30 - 11:30 AM	*Algorithms for Container Inspection at Ports: Finding Optimal Binary Decision Trees* Fred S. Roberts Rutgers University	Atrium Amphitheater
11:30 - 12:15 PM	Awards Ceremony, Raffles and Section Business	Atrium Amphitheater
12:15 - 1:15 PM	Lunch Special Greetings: Russell K. Hotzler President New York City College of Technology, CUNY	Cafeteria Namm Building, 1st Floor
1:00 - 3:30 PM	Exhibits	Namm Building, N1021
1:30 - 3:30 PM	Contributed papers and poster sessions	Namm Building, 10th floor
1:30 - 4:15 PM	Invited Workshop with Beth Chen University of Michigan	Namm Building, N1018
1:30 - 2:25 PM	Tetrahedron Packing	Namm Building, N1018
2:30 - 3:25 PM	Tetrahedron Packing	Namm Building, N1018
3:30 - 4:25 PM	Tetrahedron Packing	Namm Building, N1018
3:30 - 5:00 PM	Special presentation: *Math Bowl* (for students) Emcees: Ezra Halleck, Abe Mantell and David Seppala-Holtzman, and Thomas Tradler	Namm Building, N1022

INVITED SPEAKERS

The Frobenius Problem and Its Generalizations

Jeffrey Shallit, University of Waterloo

Abstract:

The classical but oddly little-known Frobenius problem from number theory is the following: given a set of positive integers with greatest common divisor equal to 1, find the largest integer not representable as a non-negative integer linear combination of the set elements. This largest integer is called the Frobenius number. For example, the Frobenius number of 6, 9, and 20 is 43.

In this talk I will survey some of the known results on this problem and its applications to mathematics and computer science, and a new generalization of this problem to words (strings of symbols).

Speaker Biography:

Jeffrey Shallit got his Ph.D. in mathematics in 1979 from the University of California, Berkeley, under the supervision of Dave Goldschmidt (de jure) and Manuel Blum (de facto). Since then he has taught at the University of Chicago, Dartmouth College, and the University of Waterloo. He has written three books (with Eric Bach and Jean-Paul Allouche) and published over 100 papers in discrete mathematics, number theory, combinatorics, automata theory, and formal language theory. He blogs at recursed.blogspot.com.

Algorithms for Container Inspection at Ports: Finding Optimal Binary Decision Trees

Fred S. Roberts, Rutgers University

Abstract:

As a stream of containers arrives at a port, a decision maker has to decide how to inspect them, which to subject to further inspection, which to allow to pass through with only minimal levels of inspection, etc. We look at this as a complex sequential decision making problem. Sequential decision problems arise in many areas, including communication networks, manufacturing, artificial intelligence and computer science, and medicine. The problem we investigate is to find algorithms for sequential diagnosis that minimize the total "cost" of the inspection procedure, including the cost of false positives and false negatives. To make the problem precise, we imagine a stream of containers arriving at the port with the goal of classifying each of them into one of several categories. There are several possible tests that can be performed and an inspection scheme specifies which test to perform next based on outcomes of previous tests. Stroud and Saeger at Los Alamos have formulated this problem, in an important special case, as a problem of finding an optimal binary decision tree for an appropriate binary decision function. We describe the basic idea of the Stroud-Saeger method and the results of new algorithms that improve significantly on the size of the decision problems for which it is applicable. We present a theorem that shows that certain search steps through a larger family of binary decision trees than those considered by Stroud and Saeger allows one to reach any tree in the family from any other.

Speaker Biography:

Fred S. Roberts is a Professor of Mathematics at Rutgers University, where he is a member of seven graduate faculties, in Mathematics, Operations Research, Computer Science, Industrial & Systems Engineering, Computational Molecular Biology, BioMaPS, and Education. He is Director of DIMACS, the Center for Discrete Mathematics and Theoretical Computer Science, one of the original NSF Science and Technology Centers, and Director of

the DHS Center of Excellence CCICADA, the Command, Control, and Interoperability Center for Advanced Data Analysis.

Roberts' major research interests are in mathematical models in the social, behavioral, biological, environmental, and epidemiological sciences, of problems of communications and transportation, and for addressing issues arising in homeland security; graph theory and combinatorics and their applications; measurement theory; utility, decision making, and social choice; and operations research.

His first book, *Discrete Mathematical Models, with Applications to Social, Biological, and Environmental Problems,* has been called a classic in the field, and was translated into Russian. He has also authored three other books: *Graph Theory and its Applications to Problems of Society*; *Measurement Theory, with Applications to Decision Making, Utility, and the Social Sciences*, republished in 2009; and *Applied Combinatorics* (with Barry Tesman), also republished in 2009 and translated into Chinese.

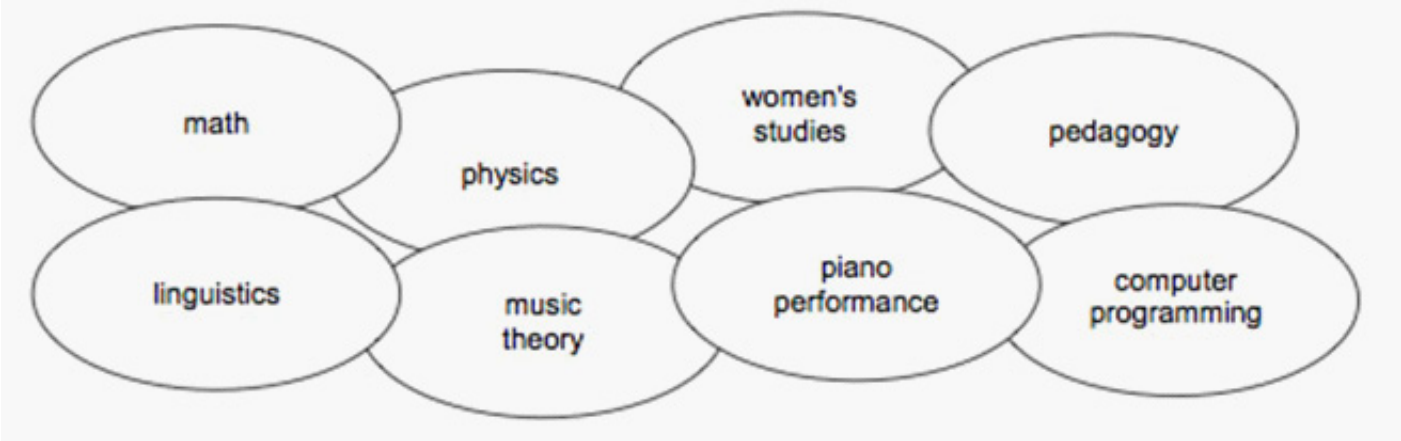
Roberts is also the editor of eighteen other books covering energy modeling, reliability of computer and communication networks, mathematical psychology, computational biology, precollege discrete mathematics, etc., and the author of169 scientific articles.

Professor Roberts has received a University Research Initiative Award from AFOSR, the Commemorative Medal of the Union of Czech Mathematicians and Physicists, and the Distinguished Service Award of ACM-SIGACT. He also received the NSF Science and Technology Centers Pioneer Award in a ceremony at NSF.

Tetrahedron Packing (Workshop)
Beth Chen, University of Michigan

Abstract:
Play with plastic tetrahedra! Join us for a hands-on experience! (Check the recent New York Times article: http://www.nytimes.com/2010/01/05/science/05tetr.html)

Speaker Biography:



(for more, please visit Beth's website: http://www-personal.umich.edu/~bethchen/)

CONTRIBUTED PAPER AND POSTER SESSIONS

10TH FLOOR NAMM BUILDING 1:30 P.M. – 3:30 P.M.

PEDAGOGY SESSION:

NAMM BUILDING, ROOM N1022

Presider: Omar Ait Hellal, LaGuardia Community College, CUNY

1:30 p.m. **Connecting Linear and Quadratic Models**
Mangala Kothari, LaGuardia Community College

LaGuardia's Project Quantum Leap program adapts the nationally recognized SENCER (Science Education for New Civic Engagements and Responsibilities) approach of teaching science and higher-level mathematics to lower-level mathematics courses. Topics from Environmental science, Public health, Economics, or Finance are used to design activities that help students develop mathematical skills and conceptual understandings. This paper showcases activities based on the topic 'Pollen Count Levels and Allergies'. We will present ways to use these activities and students' reflections to deepen their understanding of the public health issues as well as mathematical concepts such as linear functions, quadratic functions, evaluation of functions, and interpretation of graphs.

1:50 p.m. **Using Mathematics of Mass Vaccincations in a College Algebra Course**
Vladimir Przhebelskiy, LaGuardia Community College

The recent outbreak of the H1N1 flu and the vaccine shortage offers educators a great opportunity to introduce the math of epidemics in the classroom. Although the classic SIR (Susceptible Infected and Removed) model for the spread of an epidemic requires the knowledge of nonlinear differential equations, in this talk I will demonstrate how elementary algebra is used for analyzing infectious diseases, particularly how vaccination helps control and eliminate infectious diseases. Each virus is assigned a number called the reproduction rate; it is the number of secondary infections produced by one primary infection in a totally susceptible population. The vaccination of the population changes the reproduction rate. Mathematical topics covered in this project include (i) linear equations and (ii) functions. By adopting this material as a project in an elementary algebra course, students will learn mathematics through urgent and current public issues.

2:10 p.m. **The Peer-Led Team Learning Model: Highlighting Student Success in Mathematics**
Arnavaz Taraporevala, New York City College of Technology
Janet Liou-Mark, New York City College of Technology
AE Dreyfuss, New York City College of Technology
Sung Soo Moon, New York City College of Technology (student)

What is Peer-Led Team Learning (PLTL)? What are the effects of PLTL workshops embedded in an Intermediate Algebra and Geometry course and a Calculus II course? Can workshops improve student learning and retention? The presenters will discuss strategies they use to promote student success in the two classes along with example modules. A former student and now peer leader will share his perspective.

2:30 p.m. **Bringing Neuroscience into the Mathematics Classroom**
Alexander Atwood, Suffolk County Community College

Two concepts in neuroscience help inform how students learn mathematics: working memory and the society of mind. Working memory, conceptually formulated by Alan Baddeley and Graham Hitch in 1974, is composed of four major components in the human brain: a central executive that controls conscious decision making, a visuospatial sketchpad for the storage and manipulation of visual information, a phonological loop for the silent repetition of phrases, and a short term memory buffer for the storage of small amounts of information. The society of mind, conceptually formulated by Marvin Minsky and Seymour Papert in 1986, is a way to understand how conceptual connections and complex intelligence in the human brain emerge from the interaction of relatively simple cognitive agents. Working memory is intimately tied to fluid intelligence, the type of intelligence that enables humans to solve novel mathematical problems. The construction of connections between mathematical concepts in the human mind is enabled by the society of mind. Students can benefit greatly from understanding how working memory and the society of mind enable them to create important linkages between mathematical concepts and to solve mathematical problems.

2:50 p.m. **Clicking Basic College Mathematics and Beyond**
Jerry Chen, Suffolk County Community College
Myung-Chul Kim, Suffolk County Community College

In Basic College Mathematics courses, combined with visual lessons, the Clicker Teaching Technique (CT2) is used to ask good questions. CT2 is proven to enhance student success, increase conceptual understanding, and promote critical thinking and intellectual discovery in an interactive environment. Almost all students expect and enjoy learning with the clickers!

3:10 p.m. **Visual Analysis of Functions**
Andrew Grossfield, Vaughn College

This session will display a portion of a slideshow which was created as an accompaniment to the paper, "Visual Analysis and Composition of Functions," presented at the 2009 annual ASEE conference. The paper can be acquired at the website www.asee.org. The discussion will stress common sense principles of curve sketching which can enable pre-calculus and calculus students to easily graph equations as a check of their graphing calculators. Included will be principles of vertical and horizontal translations of curves as well as visualizations of vertical and horizontal scaling, principles of addition and multiplication of functions.

RESEARCH SESSION:
NAMM BUILDING, ROOM N1001

Presider: Emad Alfar, Nassau Community College

1:30 p.m. **New Wallis- and Catalan-Type Infinite Products for π, e, $\sqrt{2+\sqrt{2}}$**
Jonathan Sondow, Princeton University (alumnus and presenter)
Huang Yi, Beijing Normal University (co-author)

We generalize Wallis's 1655 infinite product for $\pi/2$ to one for $(\pi/K)\csc(\pi/K)$ as well as give new Wallis-type products for $\pi/4$, 2, $\sqrt{2+\sqrt{2}}$, $2\pi/3\sqrt{3}$ and other constants. The proofs use a classical infinite product formula involving the gamma function. We also extend Catalan's 1873 infinite product of radicals for e to Catalan-type products for $e/4$, $\sqrt{e}$, and $e^{3/2}/2$. Here the proofs use Stirling's formula. Finally, we find an analog for of Pippenger's 1980 product for $e/2$, and we conjecture that they can be generalized to an infinite product for a power of $e^{1/K}$. Our paper is to appear in The American Mathematical Monthly.

1:50 p.m. **Analysis of Genetic Transpositions using Young Tableaux**
Sanju Vaidya, Mercy College

Evolution of certain herpes viruses such as EBV (Epstein-Barr virus), and HSV-1 (Herpes simplex virus) involves genetic transpositions which are certain types of chromosomal rearrangements. In a genetic transposition, a segment of chromosome is cut off and pasted at a different location; that changes the order of the genes. Sorting permutations by transpositions is the problem of finding transposition distance between a given permutation and the identity permutation, which is the minimum number of genetic transpositions to express a given permutation as a product of them. We will use properties of Young tableaux to calculate the transposition distance for certain permutations. In the third volume of his book on the *Art of Computer Programming*, Knuth has refined a sorting procedure for sequences of integers which was originated by Robinson and Schenstead. The Robinson-Schenstead-Knuth (RSK) procedure gives a one-to-one correspondence between permutations and pairs of Young tableaux of the same shape. We will use the RSK correspondence between permutations and Young tableaux, the concept of cycle graph of a permutation, lower bounds for transposition distance established by V. Bafna and P- Pevzner and theorems of C. Schenstead about the length of the longest increasing subsequence of a permutation to calculate the transposition distance for certain permutations.

2:10 p.m. **Basic Concepts of Geometric Mechanics**
Robert A. Lowry, Suffolk County Community College

Using the free rigid body as an example, in this introductory talk I will discuss the basics of classical mechanics from a geometric perspective. In particular, I will discuss the basics of the Lagrangian, Hamiltonian, and Poisson formalisms in mechanics, their historical origins, as well as their geometric interpretations in terms of manifolds and related geometric structures. I will also discuss the role of symmetry in mechanical systems and the related notions of reduction theory. If time permits, I will discuss some applications of these structures to general relativistic fluid systems.

2:30 p.m. **The 0/0.5/1 Algorithm: Determining a Point Outside/On/Inside an Enclosed Region**
Jack-Kang Chan, Queensborough Community College,CUNY

In studying an electrocardiography (ECG) simulation of blood flow, a problem arises of determining whether a given point is within or outside a simulated heart. We may view our simulated heart as an inverted dome that consists of layers of planar regions enclosed by smooth contours. That is, we have an enclosed region with known coordinates that define this region. It seems a simple problem, if we plot the given point together with the region. By studying this plot, a solution can be visually seen. The challenge is using a computer program to find this solution. By applying the Cauchy integral formula in complex variables, we obtain one of the three values 0, ½, and 1, depending on whether the point is outside, on, or inside the region, respectively. Digital implementation of this 0 /0.5/1 algorithm is a simple task using MATLAB™. We will illustrate this algorithm with an example, and we also study the effect of reducing the number of points that defines the contour. Furthermore, we clarify the relation between the Cauchy integral formula in complex variables, Green's theorem in advanced calculus, and the famous area formula for a polygon in analytic geometry.

2:50 p.m. **Asymptotics of Weighted Lattice Point Counts inside Dilating Polygons**
Marina Nechayeva, LaGuardia Community College, CUNY (presenter)
Burton Randol, CUNY Graduate Center (co-author)

We study the family of normalized discrete measures induced on the unit circle by radially projecting onto the circle the integral lattice points contained in dilations of a fixed polygon satisfying certain algebraic properties. We examine the asymptotic effect of such measures on a function f on S1 by weighting the lattice points

and their projections by a homogeneous extension of f to R2. We then derive an "almost everywhere" result for almost all rotations of the polygon.

3:10 p.m. **The Lambert W function and Epidemic Models**
Frank Wang, LaGuardia Community College, CUNY

The Lambert W function is an inverse of. Although this function is not widely known among students, many standard textbook problems (e.g. predator-prey equations) can be solved in terms of this function. In this presentation, we will introduce the application of the Lambert W function to the classic SIR (susceptible, infected, and removed) epidemic model. Specifically, we will show that the stable fixed point of this nonlinear dynamical system can be expressed in terms of the W function. The epidemic threshold phenomenon is interpreted as a transcritical bifurcation, and a widespread breakout of an infectious disease is visualized using the bifurcation diagram (expressed in terms of the W function). We will comment on the limitations of the classic SIR model and discuss some modified models.

MISCELLANEOUS SESSIONS:
NAMM BUILDING, ROOM N1017

Co-Presiders: Zahidur Rahman, LaGuardia Community College
Paul West, LaGuardia Community College

1:30 p.m. **A Dozen Numbers for Your Thought**
Jay L. Schiffman, Rowan University

The Mathematical Association of America during the past year has featured its number of the day. These numbers generally possess illuminating properties which render them appealing. My paper focuses on one dozen numbers selected from aspects of number theory entailing prime sums, prime magic squares, odd abundant integers, prime decades, home primes, and Fibonacci numbers. The goal is to answer the following mystifying question: What is special about these numbers?

1:50 p.m. **Where is the Center of the Graph of a Polynomial?**
Ron Skurnick, Nassau Community College
Mohammad Javadi, Nassau Community College

Have you ever looked at the graph of a polynomial of degree $n \geq 2$ and noticed that there appears to be one particular point on the graph about which the graph is more symmetrical than it is about any other point on the graph? We call this point the center of the graph of a polynomial. In this presentation, we will show how to locate the center and then consider several illustrative examples.

2:10 p.m. **Problem Solving by Change of Form**
Russell Coe, Suffolk County Community College

In this presentation I will show that many standard problem solving techniques are specific cases of a more general, comprehensive technique: changing the problem's form or its structure. This technique appears in algebra, geometry, trigonometry, and calculus, for instance. The key idea is to recognize that changing the problem's form is a problem-solving technique. When one comes upon another problem without knowing a direct way to solve it, one may find a solution by first considering ways of changing its form. This opens the door for solving a variety of other problems. As a general technique, changing the form involves creative thinking and expands our problem solving skills and thinking processes.

2:30 p.m. **Power Play**
Gerald Flynn, Farmingdale State College

The fact that an exponential function eventually dominates all power functions is an important one for Calculus students. For example, this fact often occurs when applying the ratio test in determining the convergence of an infinite series. However, this fact is rarely presented in a formal way. I will offer a simple approach that should be comprehensible to all Calculus (and even most Precalculus) students. Just for fun, we will conclude by looking at an old favorite, which is greater π^e or e^π ?

2:50 p.m. **Intuition-Based Teaching Mathematics for Engineers**
Alexander Vaninsky, Hostos Community College, CUNY

It is suggested to teach Mathematics for engineers based on the development of mathematical intuition. Thus, the teaching combines conceptual and operational approaches. It is proposed to teach primary mathematical concepts based on the discussion of carefully selected case studies and then the solutions of algorithmically generated problems that focus on appropriate mathematical tools. The former component helps the development of mathematical intuition; the latter applies adaptive instructional technology to the improvement of operational skills. In the paper, the proposed approach is applied to teaching uniform convergence and to mathematics knowledge generation using Computer Science object-oriented methodology.

3:10 p.m. **New Infinite Product Representations for tanh() and sech() lead to new Fibonacci-Lucas Representations and Much More**
Harvey J. Hinden, Emerging Technologies Group, Inc.

New infinite product representations of certain standard trigonometric and hyperbolic tangent and hyperbolic secant functions were developed and published very recently. They can be used to derive new identities and relationships for trigonometric functions, hyperbolic functions, functions related to these functions, and to derive other interesting and curious functions. This talk presents some of these results. We start with a very brief review of the techniques needed to derive the new hyperbolic function infinite product representations. Then, various forms of the new representations are shown. Convergence speed of the new representations is briefly discussed. In the next part of the talk, the relationship between Fibonacci and Lucas numbers and hyperbolic functions is briefly reviewed. This relationship is used to derive hitherto not known representations of Fibonacci and Lucas numbers in terms infinite products of combinations of the index of these numbers, pi, the natural logarithm, and the golden ratio. The derived equations are surprisingly simple. Finally, some areas for future work are indicated and some of this work has started.

STUDENT SESSION:
NAMM BUILDING, ROOM N1002

Presider: Holly Carley, New York City College of Technology

1:30 p.m. **Ken-Ken and Its Underlying Algebra**
Michael Capizzo, St. Joseph's College (student)
Advisor: David Seppala-Holtzman

Ken-Ken is a strategy game that involves filling in an n by n grid with the integers from 1 to n in such a way that every number appears in each row and in each column exactly once. This brings to mind the binary operation table of a finite group. It turns out that the algebraic structure that naturally arises is, in general, less rich than a full-fledged group. Nevertheless, it is not without interest. In our presentation, we examine this structure, deduce

various properties, and consider the repercussions for the game of Ken-Ken.

1:50 p.m. **Lights Out: A Mathematical Analysis**
Jesse Stancati, St. Joseph's College (student)
Concetta Simon, St. Joseph's College (student)
Advisor: David Seppala-Holtzman

Lights Out is a game played on an n by n grid in which a light is positioned at each grid point. Each light is, simultaneously, a button which, when pushed, changes the state (from off to on or from on to off) of the light at that location as well as the lights that are located at the four adjacent neighbors. The game begins with some initial configuration of some lights being on and others off. The object of the game is to press a sequence of buttons turning all of the lights off. In our presentation, we analyze this game as a linear system, modulo 2. We determine, given n, precisely which initial configurations are solvable. Moreover, for a solvable initial state, we can determine the optimal sequence of buttons to be pushed.

2:10 p.m. **Introduction to Lie Algebras and their Representations**
Wainwright Joseph, Queens College, CUNY (student and presenter)
Advisor: Andrew Douglas, New York City College of Technology, CUNY

A vector space over the complex numbers C, together with a multiplication that satisfies certain properties, is called a Lie algebra over C. One example is the set of all 2 by 2 matrices with trace zero and multiplication given by the commutator. It is denoted sl(2,C). The Lie algebra is an abstract algebraic structure that is ubiquitous in both mathematics and physics. A natural question is how do Lie algebras act on vector spaces? Representation theory tries to answer this question. In this talk, we give an overview of Lie algebras and their representations. The presentation will be based on examples and focus on an intuitive understanding. It will be at a level appropriate for undergraduate students.

2:30 p.m. **Proving Kepler's Planetary Laws**
Gina Fumai, St. Joseph's College (student)
Jessica Foley, St. Joseph's College (student)
Dylana Suarez, St. Joseph's College (student)
Advisor: Vasil Skenderi

Johannes Kepler contributed three laws about planetary motion based on observations around the year 1605. However, Kepler did not provide the conditions under which the relationships his laws described would be possible. Despite the scientific genius, he lacked the mathematical proof. Isaac Newton provided the conditions using Euclidean geometry. As a consequence, he created his Universal Law of Gravitation. Now, however, we have provided the mathematical proof to Kepler's Laws of Planetary Motion while following Newton's Universal Law of Gravitation through the use of calculus. Our proof uses differential equations, area under a curve, and integration.

2:50 p.m. **Workshops in Calculus: Dual Benefits for Peer Leaders and Participants**
Steven Lora, New York City College of Technology, CUNY (student)
Frank Aline, New York City College of Technology, CUNY (student)
Advisor: Janet Liou-Mark

Can workshops help students do well in Calculus? What are the benefits for peer leaders facilitating these workshops? Peer-Assisted Learning Workshops, adapted from the Peer-Led Team Learning instructional model, are offered as a stand alone session and as an embedded course requirement. The benefits to both peer lead-

ers and students participating in these workshops will be presented.

3:10 p.m. **The Peer-Assisted Learning Workshops in Introductory Mathematics Courses**
Lori Younge, New York City College of Technology, CUNY (student)
Jodi-Ann Young, New York City College of Technology, CUNY (student)
Yvency Marcellus, New York City College of Technology, CUNY (student)
Advisor: Janet Liou-Mark

How can students overcome the challenge of not fully understanding and retaining the concepts taught in introductory mathematics courses? Twigg (2004) notes "Research I universities commonly cite a 15 percent drop-failure-withdrawal (DFW) rate in introductory courses. Comprehensive universities' DFW rates range from 22 percent to 45 percent in these courses. Community colleges frequently experience DFW rates of 40 percent to 50 percent or more." What can an institution do to help students perform well in these fundamental core courses? Results from many studies will be discussed. They show that students who are actively involved in the learning process and participate in small groups retain more than students who work alone. Through Peer-Assisted Learning (PAL) workshops, students are actively engaged in peer-led groups and begin to build a strong foundation in these core courses.

POSTER SESSION:
NAMM BUILDING, ROOM N1004

Presider: Satyanand Singh, New York City College of Technology

Using Technology to Improve Mathematical Education
Nadia Benakli, New York City College of Technology, CUNY
Satyanand Singh, New York City College of Technology, CUNY
Arnavaz Taraporevala, New York City College of Technology, CUNY

Technology has become prevalent in all facets of mathematics instruction. The presenters will give innovative examples using a computer algebra system to enhance mathematical concepts in their classrooms.

Application of Compelling Contexts in Teaching Mathematics
Sreedevi Ande, LaGuardia Community College

LaGuardia is the first community college in the country to adapt the Science Education for New Civic Engagements and Responsibilities (SENCER) approach to developmental math courses. In adapting the SENCER approach, a single, engaging context is explored for each level of mathematics. To enhance mathematical understanding, environmental science is used as a theme in teaching Pre-Algebra. The poster will include activities implemented in class, students' reflections on the knowledge gained through these activities, and measurements of how effectively they have supported math learning.

Enriching Activities for Teaching Middle School Mathematics Curriculum
Jomayra E. Mendez, Mercy College (student)
Oreene L. Hickman, Mercy College (student)
Advisor: Sanju Vaidya

Teaching the middle school mathematics curriculum to students with various needs is challenging and rewarding. Laws such as the "No Child Left Behind Act of 2001" and the "Individuals with Disabilities Act of 2004" support the idea that all students should be taught the same general education curriculum. However, bilingual students and special education students have many difficulties understanding mathematical concepts. We study various instructional strategies and incorporate them into lessons that teachers can use in their classrooms. We create games to explain various concepts in mathematics for middle school students. The games focus on algebraic reasoning and developing problem-solving skills. This will make learning more exciting and enjoyable for students at all levels, especially bilingual students and special education students.

Mathematical Modeling for Analysis of Genetic Background and Healthcare Coverage

Sanam Hafeez, Mercy College (student)
Diana Hernandez, Mercy College (student)
Ray Poole, Mercy College (student)
Jouvelle Aguiar, Mercy College (student)
Feyisayo Obasa, Mercy College (student)
Advisor: Sanju Vaidya

Our study uses the mathematical model of Hardy-Weinberg to find out the statistics of all the ethnic groups in the United States affected with two diseases: cystic fibrosis and sickle cell anemia. Both of these genetic diseases are inherited in an autosomal recessive pattern, which means both copies of the gene in each parent have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but are not affected by the disease. We examined how gene therapy can help prevent the spread of genetic disorders.

Interesting Graphs whose Vertices are Forests

Alex Michel, Pace University (student and presenter)
Edgar D. DuCasse, Pace University (co-author)
Louis V. Quintas, Pace University (co-author)
Adam DePhillips, Pace University (co-author)

A graph G is said to be an f-graph if G has no vertex of degree greater than f. Define F(n, f) to be the graph with vertices the set of unlabeled f-forests of order n with vertex v adjacent to vertex u if and only if, up to isomorphism, v and u differ by exactly one edge. Note that if v is adjacent to u, then either v is a one-edge deleted subforest of u or v is a one-edge extended super f-forest of u. Theorems and algorithms for the order and size of F(n, f) are discussed.

Pricing of European Call Options on Google Stock

Denise Porter, New York City College of Technology, CUNY (student)
Van Anh Truong, New York City College of Technology, CUNY (student)
Advisor: Boyan Kostadinov

We investigate a Monte Carlo simulation approach for estimating the price of a call option on Google stock. We use the classical Black-Scholes model, which specifies the dynamics of the underlying stock price movement as a Geometric Brownian Motion. We then use the risk-neutral pricing technique to value the call option. Finally, we compare our results with the actual market price of the call option on Google stock from the Chicago Board of Options Exchange.

From Fishing to Finance – A Dynamic Programming Approach

Andrew Vaughn, New York City College of Technology, CUNY (student)

Thomas Cheung, New York City College of Technology (student)
Advisor: Boyan Kostadinov

We investigate a Dynamic Programming Approach for solving a management problem related to finding the optimal fishing strategy for a given number of seasons, given initial fish quantity and the growth rate of the fish population over a season (if no fishing takes place during that season) as well as the cash flows that can be generated from the caught fish. The same approach is then used to value American options on Google stock using a multi-period Binomial model and arbitrage-free pricing in the form of risk-neutral valuation.

Peer Leading Workshops in Mathematics: Voices from Novice Leaders

Ireen Bary, New York City College of Technology, CUNY (student)
Hyeongi Kim, New York City College of Technology, CUNY (student)
Chen Wei Pua, New York City College of Technology, CUNY (student)
Karmen Yu, New York City College of Technology, CUNY (student)
Yi Ming Yu, New York City College of Technology, CUNY (student)
Guannian Zeng, New York City College of Technology, CUNY (student)
Advisor: Janet Liou-Mark

The opportunity to facilitate workshops in mathematics provides students with an experiential learning experience. For good students majoring in applied mathematics or another field, taking on a leadership position has allowed them to think of mathematics in a different way. Not only has this position reinforced prior knowledge, but also unforeseen skills are being discovered and cultivated. Voices from novice peer leaders will be presented.

Nosocomical Infection and our Community – a SENCER-based Project

Farjana Ferdousy, New York City College of Technology (student)
Aionga Pereira, New York City College of Technology (student)
Advisor: Urmi Ghosh-Dastidar

Nosocomial infections (NI) are infections that are usually transmitted to the patients during the course of receiving treatment for other conditions within healthcare facilities. Antibacterial resistance is an emerging problem in many bacterial infections and in particular, in NI infections. In this project, we studied three of the most common pathogens responsible for NI infections: Klebsiella, Pseudomonas, and Acinetobacter. Single patient isolates were collected from fifteen different hospitals in Brooklyn during a three-month period in 2006. Susceptibility and resistance to five of the most important antibiotics are studied. We assumed our null hypothesis as no significant differences exist between different Brooklyn hospitals and susceptibility rates to these five antibiotics. A chi-squared test revealed that there exist significant differences among different hospitals and antibiotic resistance with some exceptions. Now the question that we need to answer is as follows: what are the underlying causes of these differences?

Twisted Curves that are Shrouded in Linearity

Wei Dong Liu, New York City College of Technology, CUNY (student)
Emil Ifraimov, New York City College of Technology, CUNY (student)
Kwasi James, New York City College of Technology, CUNY (student)
Elizabet Mills, New York City College of Technology, CUNY (student)
Stanislav Shur, New York City College of Technology, CUNY (student)
Dingua Zeng, New York City College of Technology, CUNY (student)
Advisor: Satyanand Singh

We will make a calculus-based investigation of certain cubic and trigonometric curves of two variables. We will unmask their salient properties to illustrate their seemingly pathological behavior.

A Calculus-free Minimization of a Function of Two Variables & Programming MAPLE to Animate and Solve an Optimization Problem

Eti Akter, New York City College of Technology, CUNY (student)
Advisor: Satyanand Singh

We will minimize a function of two variables by applying the properties of conic sections. This approach is in lieu of the standard multivariate calculus methods. We will use MAPLE to illustrate our results. We will also program MAPLE to animate the minimal distance between a curve and a point away from the curve. We will show how this method can be extended to solve problems of this type.

Unraveling the Mysterious Google Search Engine

Thomas Cheung, New York City College of Technology, CUNY (student)
Advisor: Satyanand Singh

We will examine the Google page algorithm and consider its Markovian properties. We will also use stochastic matrices and reveal Google's uncanny ability to extract the perfect page.

An Intriguing Probabilistic Simulation of Random Points on a Circular Path

Orlando Davy, New York City College of Technology, CUNY (student)
Jonathan Encalada, New York City College of Technology, CUNY (student)
Mohammad Hossain, New York City College of Technology , CUNY(student)
Bulat Khamitov, New York City College of Technology, CUNY (student)
Alicia Lovell Squires, New York City College of Technology, CUNY (student)
Yvency Marcellus, New York City College of Technology, CUNY (student)
Denise Porter, New York City College of Technology, CUNY (student)
Michael Thompson, New York City College of Technology, CUNY (student)
Andrew Vaughn, New York City College of Technology, CUNY (student)
Lori Younge, New York City College of Technology, CUNY (student)
Silva Renzo, New York City College of Technology, CUNY (student)
Chun Yin Yuen, New York City College of Technology, CUNY (student)
Advisor: Satyanand Singh

We will study the probability of choosing n points independently and randomly on the perimeter of a unit circle and finding the probability that they will all lie in some semicircle. This will be generalized to any sector of the circle. Applications of this result will be briefly discussed in connection with convex hulls.

Contributed Paper and Poster Sessions Organizing Committee:

Jerry G. Ianni, LaGuardia Community College (chair)
Andrew Douglas, New York City College of Technology, CUNY
Thomas Tradler, New York City College of Technology, CUNY

METROPOLITAN NY SECTION OF THE MAA
TREASURER'S REPORT
MAY 1, 2010

Accounts*	Balance	Balance
	(05/01/10)	(05/03/09)
Business Checking	9,832.50	9,392.53
Business Money Mkt Acct	5,269.15	3,267.74
6-Month Business CD	20,648.58	32,544.20

Withdrawals - Business Checking Account		(05/03/09 - 05/01/10)	
CK#	*Description*	*Amount*	*Date*
768	Dan King (reimb., 2009 spring mtg. expenses, folders, photocopying, speaker's hotel, etc.)	760.00	05/03/09
769	Webb Institute Organization (student aide, 2009 spring mtg.)	450.00	05/03/09
770	MAA (section book sales)	958.50	05/18/09
771	Ron Skurnick (registration table assistant)	100.00	05/11/09
772	Ed Burger (honorarium and auto mileage reimb.)	494.21	05/27/09
773	Dan King (post-2009 meeting dinner reimb.)	419.61	05/27/09
774	Edward Bowers (catering-spring 2009 mtg.)	3,500.00	05/27/09
775	Elena Goloubeva (spring 2009 mtg. supplies)	300.00	05/27/09
776	Amsterdam Printing (pens-spring 2009 mtg.)	191.56	06/15/09
777	Janet Barnett (travel expenses NY area)	61.45	08/17/09
778	2009 Project NExt Fellow	2,500.00	09/21/09
779	2007 Project NExt Fellow	2,500.00	10/24/09
780	2008 Project NExt Fellow	2,500.00	10/24/09
781	CulinArt, Inc. (2009 delegate assembly)	234.00	11/10/09
782	Unitech Printing & Copy Center (Graph Theory Notes)	155.00	11/11/09
783	Crown Trophy (plaques)	160.00	04/07/10
Transfer to saving account		5,000.00	01/16/10
Account Maintenance Fees (May 09 – May 10)		153.00	05/01/10

* All with JPMorgan Chase

Deposits - Business Checking Account	(05/03/09 - 05/01/10)	
Description	Amount	Date
Deposit (reg. 76 cks-$1,815.00, reg. 2 cks-$160.00, reg. 11 cks-$285.00 and walk-in reg. $605.00 cash)	2,865.00	05/16/09
Deposit (book sales spring 2009 mtg.)	985.50	05/19/09
Deposit (Metropolitan NY Sec. of MAA Graph Theory Fund, GTD 57 Donations)	185.00	06/05/09
Deposit (Metropolitan NY Sec. of MAA Graph Theory Fund)	40.00	08/27/09
MAA Subvention (2009)	1,670.00	08/27/09
Deposit (book sales spring 2009 mtg.)	131.80	11/07/09
Deposit (transfer from savings account)	3,000.00	11/07/09
Deposit (transfer from CD account)	12,000.00	01/16/10
TOTAL	20,877.30	

GRAPH THEORY FUND
METROPOLITAN NY SECTION OF THE MAA

Accounts*	Balance	Balance
	(05/01/10)	(05/03/09)
Graph Theory Fund Metro NY Sec. of MAA (Business Checking Account)	205.00	135.00

Withdrawals - Business Checking Account		(05/03/09 - 05/01/10)	
CK#	Description	Amount	Date
782	Unitech Printing & Copy Center (Graph Theory Notes)	155.00	11/11/09

Deposits - Business Checking Account	(05/03/09 - 05/01/10)	
Description	Amount	Date
Deposit (Metropolitan NY Sec. of MAA Graph Theory Fund, GTD 57 Donations)	185.00	06/05/09
Deposit (Metropolitan NY Sec. of MAA Graph Theory Fund)	40.00	08/27/09
TOTAL	225.00	

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Special Appreciation

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Dr. Bonne August, Provost & Vice President for Academic Affairs, New York City College of Technology

Dr. Pamela Brown, Dean, New York City College of Technology

City Tech Foundation

Ms. Jewel Escobar, Director, City Tech Foundation

City Tech Organizing Committee: Holly Carley, Andrew Douglas, Ezra Halleck, Janet Liou-Mark and Thomas Tradler

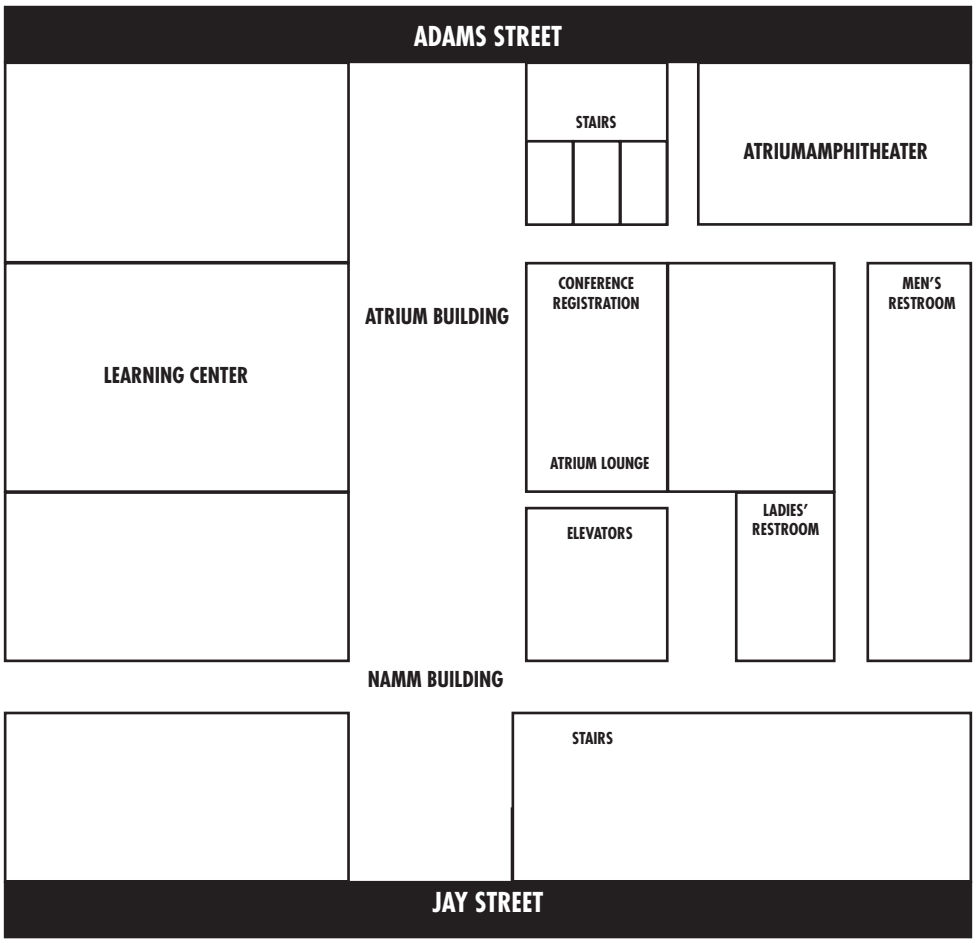
Ms. Emely Perez, Program Designer, New York City College of Technology

Mr. Thomas Cheung, CLT, New York City College of Technology

Student Assistants from Nassau Community College and New York City College of Technology

NEW YORK CITY COLLEGE OF TECHNOLOGY

GROUND FLOOR



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