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2015/16

Friday, May 06, 2016 at 3pm in S2 309 Sam Barretto, Dylan Manning, Chih-Chiun Chang, and Andres Zumba (Fresno State)

Title: ***Collaborative Research Project 2015: Tropical Mathematics and its Application to Phylogenetics***

Abstract: During the 2014-2015 academic year, Sam Barretto, Dylan Manning, Chih-Chiun Chang, Andres Zumba, and advisor, Dr. Adnan Sabuwala, participated in a month-long Collaborative Research Project event created by Wake Forest University. Our project focuses on the application of Tropical Mathematics to phylogenetics by exploring the relationships between polyhedral fans, tropical Grassmannians, tree metrics, and phylogenetic trees. In this talk, we will cover the basic ideas and background theory of the project while providing a brief summary of our results (lemmas, conjectures and applications). Our team was awarded the highest recognition as one of the primary authors for a future publication compiling the results of the Collaborative Research Project.

Friday, April 15, 2016 at 3pm in S2 309 Abhijit Suprem (Fresno State)

Title: ***Applications of Conformal Mappings***

Abstract: A conformal mapping is an angle-preserving transformation in the complex plane. In this talk, we will discuss the numerous applications of conformal mappings, which include, but are not limited to (i) fluid flow analysis to determine most likely path of streamlines in ideal fluid flow, (ii) image manipulation such as rotations, translation, scaling, skewing, and more exotic transformations such as distortions, holes, etc. that preserve image shape, (iii) robotics path-finding for obstacle avoidance, mapping, and patrol path selection, and (iv) aerodynamics analysis for aerial and ground vehicles.

Friday, April 8, 2016 at 3pm in S2 309 Adam Jauregui (Fresno State)

Title: ***Statistical Models for Prediction of Fantasy Football Points***

Abstract: Fantasy football modeling has seen a sudden spike in interest during the past few years from academic researchers. The objective of this project is to predict the National Football League (NFL) quarterbacks' fantasy points. To this end, we consider three different models and evaluate their predictive potentials. We use the maximum likelihood method to estimate the parameters and the Gibbs sampler to draw predictive values. The dataset consists of the whole-career fantasy points for twenty chosen NFL quarter- backs. The 2014 NFL season was used as a testing period to validate our models. The results show that one model consistently outperformed the other two. Additional tests were performed with the inflation-adjusted fantasy point data to test the hypothesis that we need to compensate for the fact that NFL quarterbacks average more fantasy points today than in years past.

Friday, February 26, 2016 at 3pm in S2 309 Dr. Maria Nogin (Fresno State)

Title: ***This is not a coincidence! Peculiar patterns in some Calculus optimization problems explained.***

Abstract: In this talk we consider a few Calculus optimization problems in which we notice peculiar patterns. In each of these cases there is a geometric explanation for the pattern showing that it is not just a coincidence. Moreover, these patterns will enable you to determine the answer (optimal dimensions) in a few standard Calculus problems at a glance, without doing long and tedious calculations.

Friday, February 19, 2016 at 3pm in S2 309 Dr. John Rock (Cal Poly Pomona)

Title: ***A Tabular Method for Integration by Parts***

Abstract: Integration by Parts (IBP) is a very useful technique that has a undeserved bad reputation. IBP allows us to solve a wide variety of problems in calculus and even provides a way to prove Taylor's Theorem with remainder, but the manner in which this technique is typically taught is woefully and unnecessarily inefficient. In this lecture, a tabular approach to IBP that is designed to reduce such inefficiency will be discussed and several examples will be considered. Note that this tabular method is not a shortcut. Rather, it simply avoids redundancy.

Friday, November 13, 2015 at 4pm in S2 307 Aramayis Orkusyan (Fresno State student) & David Wu (University High School student)

Title: ***Compressed Sensing: A Smarter Approach to Data Processing***

Abstract: With the advent of improved technology, digital images have become commonplace in today?s society. In addition to personal use, digital images have become prevalent in both academia and industry. Typically, images are taken at high resolutions, after which they are compressed for storage by throwing a large portion of the original data away. For example, JPEG - a standard image compression format - typically throws away about 90% of the original images. Remarkably, the images can be reconstructed from the remaining data with little to no perceptual loss in quality. As such, a natural question arises: can we take lower resolution images to begin with and still be able to reconstruct high quality images from the incomplete data? This is the central question behind Compressed Sensing - a field of applied mathematics that developed in the past decade and continues to grow. In this talk, we will introduce the ideas behind compressed sensing. In addition, we will use notions from linear algebra and calculus to answer two central questions: When can a unique image be recovered from the incomplete data and how do we construct the hardware to ensure the recovery of a unique image?

Friday, November 06, 2015 at 4pm in PB 194: Elaina Aceves and Rebekah Zhou (Fresno State students)

Title: ***The Mathematics of Tangles***

Abstract: Do you ever get your headphones tangled while they are in your pocket? Do you want to explore how to untangle them mathematically? In this hands-on activity, we will use jump ropes to construct tangles and then learn how to untangle them with the fewest number of moves. We will label each tangle with a fraction and then use some basic arithmetic to find out what moves are necessary to untangle it. The resulting process reveals interesting connections with Euclid?s algorithm for calculating the GCD of two integers.

Friday, October 30, 2015 at 4pm in PB 131: Jillian Baker and Jennifer Elder (Fresno State students)

Title: ***The Mathematics of the Game SET***

Abstract: The game SET was invented by population geneticist Marsha Jean Falco, who was using symbols on cards to find patterns in genetic data. While simple enough to be played by children, the game has a rich mathematical structure that provides avenues for research explorations in mathematics to keep the adults engaged. In this presentation, we discuss interesting combinatorial questions arising from playing a few games. This will be an informal gathering where student contributions will be highly encouraged and appreciated.

Friday, October 16, 2015 at 4pm in PB 138: Kelsey Friesen and Sarah McGahan (Fresno State students)

Title: ***The Mystery of the Möbius Strip and other Surfaces***

Abstract: Come join us for an engaging hands-on workshop in GAUSS, where we will explore various surfaces. We will begin by asking questions about the Möbius strip, such as how many sides and edges it has, and investigate what will happen when it is cut in certain ways. Then, we will delve into other surfaces, focusing on the torus, and explore the game of tic-tac-toe on these surfaces.
This will be an informal gathering where student contributions will be highly encouraged and appreciated. You don't want to miss it!

Friday, Sep 11, 2015 at 4pm in S2 307: Jennifer Elder (Fresno State student)

Title: ***The Futurama Theorem***

Abstract: What if there was a machine that could switch the brains of two people, but couldn't swap them back? How would the Math Department undo all of the swaps made by curious people? Based off a Math puzzle in an episode of Futurama, we will present a new proof that the puzzle can be solved, as well as a version of it in which the brain swapping machine can switch three people at a time.