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COLLOQUIUM

The Mathematics Department of Sonoma State University
presents a series of informal talks open to the public

Wednesdays at 4:00 pm

Darwin Hall Room 108

Coffee at 3:45 pm

SEPTEMBER 6 CHAOS AND REGULARITY

Arek Goetz, Mathematics, San Francisco State University, will illustrate basic concepts and some open questions in dynamical systems-their interplay with geometry and number theory. The talk will feature an interactive multimedia presentation and will be accessible to undergraduate students.

SEPTEMBER 13 BEYOND CALCULUS: SOAP FILMS AND HIGHER DIMENSIONS

Helen Moore, Mathematics, Stanford University, will dip more wire frames into soapy water and formulate the soap film's attempt to minimize area as a calculus optimization problem. She will use multivariable calculus plus some other ideas that will be explained and look at soap films in higher dimensions! Moore will discuss several different results, including current progress on the Gauss map problem for minimal surfaces. This talk should be accessible to any undergraduate student who has had single-variable calculus.

SEPTEMBER 20 THE VIRTUAL CLASSROOM - STATISTICS VIA THE INTERNET

Ira Lansing, Mathematics, College of Marin, teaches a section of Introduction to Probability that is 100% online. What are some of the pros and cons of this medium? The presentation will include a tour of the software and hardware that is used and a visit to the "classroom," along with a discussion of the problems and advantages afforded by a virtual classroom.

SEPTEMBER 27 GROUP MEMBERSHIP, SELF-WORTH AND TREATMENT QUALITY

Heather Smith, Psychology, Sonoma State University, discusses past and current research into how quality of treatment is linked to support of authorities and acceptance of their decisions, particularly when the authority represents a valued ingroup. The findings of two experiments and a correlational study support the argument that treatment quality in an ingroup context is particularly important because people derive their sense of self, in part, from knowing that a group they value regards them as respected members.

OCTOBER 4 A FIGURE EIGHT FOR THE THREE-BODY PROBLEM, CHOREOGRAPHIES FOR THE N-BODY PROBLEM

Richard Montgomery, Mathematics, UC Santa Cruz, will discuss his discovery of a new periodic orbit for three equal masses moving in the plane according to Newton's laws of gravity. In this orbit, three equal masses chase each other around a fixed figure eight shaped curve in the plane. Very few periodic orbits are known for the full three-body problem and, mathematically speaking at least, his may be the most important periodic orbit after those discovered by Euler and Lagrange.

OCTOBER 11 THE KURATOWSKI CLOSURE-AND-COMPLEMENT PROBLEM AND SOME EXTENSIONS

Eric Langford, Mathematics, CSU Chico, will discuss this classical problem which asserts that in any topological space, no more than fourteen sets can be formed from a given set, using the operations of closure and of complementation. Sets for which this maximum is obtained are called "14-sets" and easy examples can be found on the real line. We will characterize such 14-sets and examine related problems that occur when interiors, intersections, and unions are allowed.

OCTOBER 18 ARROW'S IMPOSSIBILITY THEOREM

Rick Luttmann, Mathematics, Sonoma State University, will explain and prove one of the most celebrated theorems of our era, the so-called Impossibility Theorem of Kenneth Arrow, proved when he was a Stanford economics professor in 1950 and for which he won the Nobel Prize. The theorem basically says that if you want to devise a voting system that satisfies certain minimal and obviously desirable criteria, the only possibility is to appoint a dictator.

OCTOBER 25 SHOW ME THE DO-RE-MI

Rick Kavinoky, Mathematics, Santa Rosa Junior College, will demonstrate a few of the many interesting connections between math and music. How are frequencies assigned to the notes of a major scale? Why is the interval of a "fifth" so important? Why is the octave divided into 12 intervals? He will show how the Discrete Fourier Transform (DFT) helps us "see" sound by breaking it into its frequency components and will also show how the DFT and filters can be implemented in software (MATLAB) to turn your computer into a musical instrument tuner.

NOVEMBER 1 THE SUN, THE MOON AND CONVEXITY

Sam Brannen, Mathematics, Sonoma State University, asks whether the path the moon makes around the sun is convex. He will model lunar paths and find the conditions for convexity, concluding that the path our moon makes about our sun is locally convex.

NOVEMBER 8 ON TRISECTION, QUINTISECTION,...ETC.

William Barnier, Mathematics, Sonoma State University, will discuss the angle trisection problem (which dates from the fifth century BC and was not solved until 2200 years later) along with its generalization, the p-section problem, where p is an odd prime number. This talk will be accessible to anyone with an interest in the "three classical problems of antiquity."

NOVEMBER 15 EXTRAORDINARY EXPONENTIALS, FRACTIOUS FRACTIONS, INSOLENT INFINITIES, PROLIFIC PRODUCTS, RADICAL RADICALS AND STUPENDOUS SUMS

George Ledin, Computer Science, Sonoma State University, fascinated since his teenage years with monster formulas involving infinite sums and products and continued fractions, will present some of his weirdest results, all nicely verified by elegant computer programs and some actually proven with clever mathematical methods. If F. Vieta's famous $2/\pi$ formula is like a firecracker, Ledin's stuff is like fireworks.

NOVEMBER 29 ATM vs. IP - CELEBRITY DEATH MATCH (Not!)

Lauren May, Director of Data Technology at Next Level Communications, will discuss two major communications protocols, Asynchronous Transfer Mode and Internet Protocol. Can peace and harmony be found between the extremes? Concepts to be discussed include multiplexing, switching, routing and quality of service. Technologies examined will include the Digital Subscriber Line, the World Wide Web, switched digital video, streaming IP media, and Multiprotocol Label Switching (MPLS).



SONOMA STATE UNIVERSITY

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