MSCS Mess

Department of Mathematics, Statistics and Computer Science — December 5, 2005
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This Week's Colloquium

Title:	Statistical Inferences on Graph-Valued Random Variables
Speaker:	David Banks, Institute of Statistics and Decision Sciences, Duke University
Time:	Tuesday, December 6, 1:30 p.m. (treats at 1:15)
Place:	SC 182

Standard statistical methods apply to situations where the observations are univariate or multivariate observations. But in some applications, such as social networks or phylogenetic trees, the observations are random graphs. Professor Banks' talk will address how many of the usual tools from statistical inference can be modified to apply to these non-standard applications.

Apply for Summer Research at Cornell University

Are you considering graduate study in the mathematical sciences? The 2006 Summer Math Institute at Cornell University can provide you with an opportunity to explore the world of mathematics and help you prepare for the rigors of graduate school. Participants spend seven weeks (June 17 – August 5) at Cornell's scenic campus in Ithaca, New York, taking an upper-level course in Real Analysis and working on interdisciplinary research projects. This year's two research areas are Dynamical Systems & Neurobiology and Random Graphs & Algorithms. Participants will have the opportunity to meet guest speakers from leading academic institutions and are encouraged to take advantage of Ithaca's many recreational activities. The program is especially looking for applications from women and minority students.

Program participants will be awarded room, board, travel and a $3000 stipend. For more information, see www.cam.cornell.edu/~smi. Online applications are due March 1, 2006.

Join the Actuarial Email List

Did you know that actuarial science is consistently rated as one of the top ten careers for job satisfaction? A strong background in mathematics is essential for succeeding as an actuary, so if you read the *MSCS Mess*, you might be a good candidate for actuarial science. We are starting an email alias for students interested in receiving messages about actuarial internships, exams, alumni contacts, etc. If you are interested in receiving these messages via email, send your name to Paul Roback (roback@stolaf.edu), and he will add you to the list.

Problem of the Week (POW)

In honor of our analytical visitors, this week's POW is about sequences:

Starting with a positive number $x_0 = a$, let $(x_n)_{n \geq 0}$ be the sequence of numbers such that

$$x_{n+1} = \begin{cases} (x_n)^2 + 1 & \text{if } n \text{ is even} \\ \sqrt{x_n} - 1 & \text{if } n \text{ is odd.} \end{cases}$$

For what positive numbers a will there be terms of the sequence arbitrarily close to 0?

*** Please submit all solutions by Wednesday at noon to Amelia Taylor by e-mail (ataylor@stolaf.edu) or by placing them in her box at OMH 201.

Last Week's Problem

Let us assume that a given pair of people either know each other or are strangers. If six people enter a room, show that there must be either three people who know each other pair wise, or three people who are pair wise strangers.

Sadly, no one submitted a solution to this POW. The solution given below is courtesy of Paul Zorn. I am interested in alternate solutions (this is elementary Ramsey theory, so there should be a solution using this; I think this basically proves that principle in this case), so please submit other arguments and I will acknowledge them and include selected solutions in future publications.

First, let us assume there are no sets of pair wise strangers; if there are, then we are done, so we assume there are not and prove that there must be a set of 3 who pair wise know each other. Let A, B, C, D, E, and F denote the six people in the group. Suppose A knows only two people, or fewer, and let the two people be labeled B and C. Then since there are no sets of 3 pair wise strangers, F, D and E must pair knowing each other, as otherwise A makes a set of pair wise strangers with a pair of F, D, or E that don't know each other, and then there is a contradiction. Thus, we are finished in this case. So now, A must know at least 3 people. Label these 3 people B, C and D. Again, because there are no groups of 3 who pair wise don't know each other, the remaining two people E and F must know each other. By a similar argument as that for person A, B must know at least 3 people as well. This leaves 2 people, besides A, that B knows. Since there are only 4 people remaining, these two people are either E and F (and B, E and F make a set of people who pair wise know each other), or at least one of these two people is C or D, and then A, B and C (or D) make a set of people who pair wise know each other.

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