Mathematics Contributed Papers I
(Walker 162)

1:30

Markov Chain Monte Carlo and its Applications

Dianne Schmidt
University of Iowa

Abstract. Markov Chain Monte Carlo is well-known technique to solve the Monte Carlo Integration using Markov Chains. Its applications are rapidly into many scientific subjects – Bayesian analysis, Biomedicine, Economics, Environmental Statistics, Computer Science, Education, Engineering and so on. Metropolis Hasting Algorithm is the major algorithm in MCMC. Gibbs Sampler is solving the analytically and numerically difficult problems.

2:00

A Parenthesis-free Notation Method of Writing Logic Statement Forms

Doug Kilburg (Student)
University of Northern Iowa

Abstract. We give a brief introduction to parenthesis-free notation (Polish notation) and present an algorithm for determining whether a given expression is a statement form in Polish notation.

2:30

Teacher Evaluation by Calculus Students

Irvin Roy Hentzel
Iowa State University

Abstract. All math classes at Iowa State University give a student evaluation at the end of the course. These evaluations have several questions dealing with the instructor, the book, the tests, and other points of interest. These responses are averaged over the section. I compared these averages with the grades given to the students in that section. I also compared long-term correlations between the performance of students in successive courses. I wanted to answer questions like these. Do high grades correspond to good teacher evaluations? If a section gives the teacher a good evaluation, do these students do better in subsequent semesters of calculus? Do full professors, associate professors, assistant professors, instructors, or visiting professors distribute grades differently? Do the students seem to prefer any of these levels of teachers over another?

3:00

A Mathematical Geneology – Part 1

Mark Sand
Dana College

Abstract. Did you ever wonder, while struggling through graduate school, under whom your dissertation advisor worked? I have begun the process of looking up my advisor's advisor, and then further back. Some fascinating stories have been found, and there should be more to come.

Mathematics Contributed Papers II (Walker 163)

1:30

A New Look At An Old Problem

Scott Searcy
Waldorf College

Abstract. A novel approach to show the divergence of the improper integral of the harmonic function ($f(x) = \frac{1}{x}$) using convergent improper integrals.

2:00

A solution to the quincunx or "Plinko" problem using Markov Chains

Eric Canning
Morningside College

Abstract. A method, utilizing Pascal's triangle, for determining the probability distribution of a Plinko board was published several years ago. However, it is incorrect. A method using Markov Chains offers a correct and nifty solution to the problem.

2:30

Teaching Multivariable Calculus Using Mathematica

Al Hibbard
Central College

Abstract. In this talk I will look at some Mathematica notebooks that I have recently developed that can be used in teaching multivariable calculus. I will also illustrate a java applet that can take 3-dimensional graphical output from Mathematica and allow one to manipulate it.

3:00

Special digraphs that arise in some matrix completion problems

Luz M. DeAlba
Drake University

Abstract. A partial matrix is a (square) matrix in which some entries are specified and others are free to be chosen. A matrix completion problem involves selecting the unspecified entries of a partial matrix so that the resulting complete matrix has certain properties. A P-matrix is one in which all principal minors are positive, while a P0-matrix has all principal minors nonnegative. In this talk we explain how to construct digraphs that represents partial matrices, then we discuss the P- and P0-matrix completion problems from the point of view of special graphs associated with partial P and P0-matrices.

Mathematics Contributed Papers III (Walker 165)

1:30

Hadamard's Real Inequality
(or why you should always use the integral version of the remainder)

A. M. Fink
Iowa State University

Abstract. Hadamard's theorem says that an integral of a convex function over a finite interval is at least as large as the value at the midpoint for any probability measure that is symmetric with respect to the midpoint. We show that the correct version requires neither that the measure be positive nor symmetric. All you have to do write the correct version.

2:00

Interactive Multivariable Calculus

Keith Stroyan
University of Iowa

Abstract. Over the last few years we have been developing materials for multivariable calculus that use modern computing to help students in math, science, and engineering learn this fundamental subject. Computing can help students understand the material at a conceptual level and, if used appropriately, can enhance traditional skills.

A large part of student work still needs to be similar to a traditional class, but our prototype contains computer graphics and moving animations that extend the graphical innovations of several earlier reform projects. These help students begin to learn many

traditional topics. With only a modest amount of computing, students themselves can also explore a broader class of examples. Beyond this, computing offers the promise of greatly expanding the kinds of problems students can actually solve and WebMathematica will allow students to compute on a regular web browser.

2:30

The Interactive Geometry Software Cinderella

Ruth I. Berger
Luther College

Abstract. The new interactive Geometry software Cinderella allows you to do sketches in Euclidean Geometry, Hyperbolic Geometry and Elliptic Geometry! This talk will be a brief introduction to Cinderella for those of you who have not seen it before. Cinderella has its advantages (and disadvantages) over Geometer's Sketchpad. Come and see for yourself how it could improve your Geometry course.

3:00

What is a Point of Inflection?
A Preliminary Report

A F Kleiner
Drake University

Abstract. Freshman calculus texts tend to give a "casual" definition of inflection point using concavity and/or a tangent crossing. This note will survey the recent history of the concept as it appears in calculus texts and journal articles. Several approaches to the definition will be compared.