

**Dan Singer**

**Professor**

**Department of Mathematics and Statistics**

**Minnesota State University, Mankato**

**dan.singer@mnsu.edu**

## **EDUCATION**

Ph.D. Mathematics, University of California, San Diego, 1992

M.A. Mathematics, University of California, San Diego, 1989

B.A. Mathematics, University of California, San Diego, 1983

Undergraduate studies in liberal arts, Reed College, 1977-80

## **RESEARCH INTERESTS**

Enumerative and Algebraic Combinatorics. Combinatorial Aspects of the Jacobian Conjecture. Number Theory.

## **TEACHING EXPERIENCE**

**Professor, Minnesota State University, Mankato, 2001 - present:** Taught undergraduate courses in discrete math, calculus I-II-III, linear algebra, abstract algebra, real analysis, differential equations, introduction to proofs. Taught the senior capstone course twice (topics: algebraic graph theory, number theory). Taught graduate courses in graph theory, abstract algebra, linear algebra, enumerative combinatorics, algebraic combinatorics, number theory.

**Visiting Assistant Professor of Mathematics, Oakland University, Rochester, Michigan, 2000 - 2001:** Taught linear algebra to undergraduates and a graduate course in graph theory and combinatorics. Also taught linear algebra lab using MATLAB.

**Visiting Assistant Professor of Mathematics, Wabash College, Crawfordsville, Indiana, 1999 - 2000:** Taught first and second-semester calculus using Mathematica. Also taught discrete math, combinatorics, abstract algebra, and linear algebra. Team-taught history of mathematics. Supervised independent study in information theory.

**Lecturer in Computer Science, University of California, San Diego, Winter 1999 and Spring 1995:** Taught mathematics for algorithms and systems analysis.

**Lecturer in Mathematics, California State University, San Marcos, 1993 - 1994:** Taught finite mathematics for business, mathematics for elementary school teaching, and mathematics in society.

**Adjunct Mathematics Instructor, San Diego City College and Miramar Community College, 1990 - 1994:** Taught algebra, trigonometry, and pre-calculus.

## **INDUSTRY EXPERIENCE**

**Systems Engineer, Tiernan Communications, San Diego, CA, 11/97 - 10/98:** Investigated algorithms for dejittering MPEG-2 traffic over ATM. Performed numerical simulations using C and MATLAB.

**Senior Engineer, Sagent Corporation, Bellevue, WA, 10/95 - 9/97:** Designed and implemented hybrid system control agent algorithms for digital signal processor. Extensive background reading in optimal control theory, stochastic control and estimation, Kalman filtering, Lie group methods for solving differential equations, calculus of variations, differential geometry.

## **PRESENTATIONS**

**A Problem In Combinatorial Linear Algebra,** Spring Meeting of the North Central Section of the Mathematical Association of America, April 27, 2013.

**A Problem in Combinatorial Linear Algebra,** Mathematics Colloquium, Department of Mathematics and Statistics, Minnesota State University, Mankato, November 20, 2012.

**A Graph-Theoretic Method for Choosing a Spanning Set for a Finite-Dimensional Vector Space,** Mathematics Colloquium, Department of Mathematics and Statistics, Minnesota State University, Mankato, March 5, 2009.

**Towards Average Case Analysis of Itemset Mining,** Conference Presentation, The 2007 International Conference on Data Mining, Las Vegas, June 26, 2007.

**A Combinatorial Analysis of Datasets and Itemsets in Data Mining,** Seminar in Algebraic Graph Theory, April 6, 2007, Department of Mathematics and Statistics, Minnesota State University, Mankato.

**Complete Disorder is Impossible: An Introduction to Ramsey Theory,** MSU Mankato Mathematics Colloquium, Spring 2003.

**On Partition Identities and the Involution Principle,** MSU Mankato Mathematics Colloquium, Spring 2002.

**Algebraic Properties of Catalan Trees,** AMS Special Session on Algebraic and Enumerative Combinatorics, Orlando, Florida, November 2002.

**On Catalan Trees and Formal Power Series Inversion,** Wabash College Mathematics Colloquium, Spring 2001.

**An Example of Mathematics in Industry: Hybrid Systems at Sagent Corporation,** AMS Special Session on Mathematics in Industry and Government, San Diego, California, January 1997.

## **PUBLICATIONS**

Dan Singer, **Toward a Combinatorial Proof of the Jacobian Conjecture!**, The Electronic Journal of Combinatorics 18(2) (2011), #P27 (The Doron Zeilberger Festschrift Volume).

Dan Singer, **A Graph-Theoretic Method For Choosing a Spanning Set for a Finite-Dimensional Vector Space, with Applications to the Grossman-Larson-Wright Module and the Jacobian Conjecture**, The Electronic Journal of Combinatorics 16 (2009), #R43.

Dan Singer, David J. Haglin, Anna M. Manning, **Towards Average Case Analysis of Itemset Mining**, Conference Proceedings of The 2007 International Conference on Data Mining, Las Vegas, pp. 127-133.

Dan Singer, **A Bijective Proof of Borchardt's Identity**, Electronic Journal of Combinatorics 11(1) (2004), #R48.

Dan Singer, **On Catalan Trees and the Jacobian Conjecture**, Electronic Journal of Combinatorics 8(1) (2001), #R2.

Dan Singer, **A  $p$ -Analogue of the  $q$ -Saalschütz Identity**, The Ramanujan Journal 3(1) (1999), 33-47.

Dan Singer, **A Bijective Proof of Garsia's  $q$ -Lagrange Inversion Theorem**, Electronic Journal of Combinatorics 5(1) (1998), #R26.

Dan Singer,  **$Q$ -Analogues of Lagrange Inversion**, Adv. Math. 115(1) (1995), 99-116.

## **OTHER ACTIVITIES**

**Reviewer**, Electronic Journal of Combinatorics, Journal of Algebraic Combinatorics.

**Judge, South Central & Southwest Minnesota Regional Science & Engineering Fair, Spring 2002, 2003.** Helped judge elementary and junior high math, physics and engineering projects.

**MSU Mankato Math Club.** Organized and led weekly mathematics problem-solving sessions. Prepared teams for Annual NCS/MAA Team Contest.

## **PROFESSIONAL ORGANIZATIONS**

Member, American Mathematical Society and Mathematical Association of America.