Roy M. Araiza — Curriculum Vitae

Contact Information

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Employment

1. J.L. Doob Research Assistant Professor — August 2021-Current
   Department of Mathematics, University of Illinois at Urbana-Champaign

Education

- Ph.D., Mathematics, Purdue University — August 2015- April 2021
  Thesis: "On the abstract structure of operator systems and applications to quantum information theory"
  Advisor: Thomas J. Sinclair
- B.A., Mathematics, San José State University — December 2014
  Advisor: Timothy Hsu

Appointments

5. Institute Affiliate — August 2021-Current
   Illinois Quantum Information Science and Technology Center
4. J.L. Doob Research Assistant Professor — August 2021-Current
   Department of Mathematics, University of Illinois at Urbana-Champaign
3. Purdue Research Foundation Fellow — June 2019-June 2020
   Department of Mathematics, Purdue University
2. GAANN Fellow — January 2016-January 2018
   Department of Mathematics, Purdue University
1. Andrews Fellow of Mathematics — August 2015-December 2020
   Department of Mathematics, Purdue University

Visiting Research Positions and Extended Stays

4. Visiting Researcher — September 2023
   Department of Mathematics, University of Oslo
3. Visiting Researcher — June-July 2022
   Mathematisches Institut WWU Münster
2. Thematic Research Program: Operator Algebras, Groups and Applications to Quantum Information, Instituto de Ciencias Matematicas, Madrid, Spain — May 2019
1. Long Program on Quantitative Linear Algebra, Institute for Pure and Applied Mathematics, University of California, Los Angeles, California, USA — March-June 2018

Short Research Visits

10. Department of Mathematics, Texas Christian University, Host: Travis Russell — November 2023
9. Department of Mathematics, Purdue University, Host: Thomas Sinclair — July 2023

8. Department of Physics, Purdue University, Host: Nima Lashkari — April 2023
7. Department of Computer Science, Columbia University, Host: Henry Yuen — December 2022
6. Department of Mathematics, University of Virginia, Host: Ben Hayes — April 2022
5. Army Cyber Institute, United States Military Academy, West Point
   Host: Travis Russell — February 2020
4. Department of Mathematics, University of Illinois at Urbana-Champaign
   Host: Marius Junge — October 2019
3. Department of Mathematics, University of Virginia, Host: Ben Hayes — October 2019
2. Department of Mathematics, Sam Houston State University, Host: Damon Hay — March 2019
1. Department of Mathematics, Texas A&M, Host: Gilles Pisier — March 2019

Research Visitors

5. Thomas Sinclair, Purdue University — August 2023
4. David Kribs, University of Guelph — April 2023
3. Graeme Smith, University of Colorado Boulder — April 2023
2. Nima Lashkari, Purdue University — March 2023
1. Alexander Müller-Hermes, University of Oslo — November 2022

Research Interests

My research interests are in operator space theory, and quantum information theory.

- Tensor theory of operator spaces
- Tensor theory of operator systems
- Local structure of operator spaces and operator systems
- Quantum games
- Quantum error correction

Publications and Preprints

10. A note on the stabilizer formalism via noncommutative graphs (with Jihong Cai, Yushan Chen, Abraham Holtermann, Chieh Hsu, Tushar Mohan, Peixue Wu and Zeyuan Yu) (2023) arXiv: 2310.00762
9. Resource dependent complexity of quantum channels (with Yidong Chen, Marius Junge, and Peixue Wu) (2023) arXiv:2303.11304 [v2]
8. Lipschitz complexity (with Yidong Chen, Marius Junge, and Peixue Wu) (2023) arXiv:2303.11304 [v1]
   Accepted Lecture: Beyond IID 11, University of Tübingen, Germany, 2023
7. Operator systems generated by projections (with Travis Russell) (2023)
   arXiv:2302.12951. Submitted
6. An index for inclusions of operator systems (with Colton Griffin and Thomas Sinclair) (2022).
   arXiv:2203.05710. To appear: Journal of Operator Theory

5. Approximating projections by quantum operations (with Colton Griffin, Aneesh Khilnani, and Thomas Sinclair) (2022) arXiv:2203.02627. Published: Linear Algebra and Its Applications. Volume 663 (2023), 179-199

4. Matricial Archimedean order unit spaces and quantum correlations (with Travis Russell and Mark Tomforde). (2021) arXiv:2109.11671. To appear: Indiana University Mathematics Journal

3. A universal representation for quantum commuting correlations (with Travis Russell and Mark Tomforde). (2021) arXiv:2102.05827. Published: Annales Henri Poincaré. Volume 23 (2022), 4489-4520. DOI: 10.1007/s00023-022-01197-7

2. An abstract characterization for projections in operator systems (with Travis Russell). (2020) arXiv:2006.03094. Published: Journal of Operator Theory. Volume 90 (2023), 41-72

1. $\mathcal{R}$ we living in the matrix? (with Rolando de Santiago). Notices of the American Mathematical Society. Volume 66, Number 8, (2019), Pgs. 1216-1224.

Honors and Awards

6. AMS Travel Grant — March 2020
American Mathematical Society

5. Purdue Research Foundation Grant — June 2019
Department of Mathematics, Purdue University

4. GAANN Fellowship — January 2016
Department of Mathematics, Purdue University

3. Andrews Fellowship — August 2015
Department of Mathematics, Purdue University

2. Mervin L. Keedy Scholarship — August 2015
Department of Mathematics, Purdue University

1. College of Science Dean's Scholar — December 2014
College of Science, San Jose State University

Invited Lectures

37. Department of Mathematics Colloquium, Texas Christian University, — November 2023
Title: TBD

36. East Coast Operator Algebras Symposium, Purdue University — October 2023
Title: Resource Dependent Complexity of Quantum Channels

35. Mathematics for Quantum Computation and Many-Body Theory Seminar — September 2023
University of Oslo
Title: Resource Dependent Complexity of Quantum Channels

34. Recent Developments in Operator Algebras and Quantum Information Theory — September 2023
AMS Fall Eastern Sectional, University at Buffalo (SUNY), Buffalo, NY
Title: Resource Dependent Complexity of Quantum Channels

33. Analytical and Combinatorial Methods in Quantum Information Theory II — July 2023
International Centre for Mathematical Sciences, Edinburgh, Scotland
Title: An Index for Inclusions of Operator Systems

32. Workshop III in Von Neumann Algebras and Geometric Group Theory — April 2023
University of Iowa
Title: An Index for Inclusions of Operator Systems

31. High Energy Theory Physics Seminar, Purdue University — April 2023
Title: An Index for Inclusions of Operator Systems

30. Operator Algebras Seminar, Purdue University — April 2023
Title: Operator Systems Generated by Projections

29. Quantum Information and Computing Seminar, University of Delaware — November 2022
Title: An Index for Inclusions of Operator Systems

28. Research Scholars Seminar, Discovery Partners Institute, Chicago, IL — September 2022
Title: Quantum Information Theory: an intro from the theoretical viewpoint

27. Lecture Series, KnOttawa Summer School 2022, Kansas State University — July 2022
Lecture Series Topic: Quantum Information Theory

    (a) Lecture 1: The Postulates of Quantum Mechanics Part I
    (b) Lecture 2: The Postulates of Quantum Mechanics Part II
    (c) Lecture 3: Quantum Operations and Quantum Noise Part I
    (d) Lecture 4: Quantum Operations and Quantum Noise Part II
    (e) Lecture 5: Quantum Error Correction

26. Kleines Seminar, WWU Münster, — June 2022
Title: The Postulates of Quantum Mechanics and Further Observations

25. Oberseminar C^*-algebren, WWU Münster, — June 2022
Title: A Universal Representation for Quantum Commuting Correlations

24. Operator Theory Seminar, University of Virginia — April 2022
Title: Matricial Archimedean Order Unit Spaces and Quantum Correlations

23. AMS Spring Southeastern Sectional Meeting on "Advances in Operator Algebras" — March 2022
University of Virginia
Title: TBD (Meeting Canceled)

22. Plenary Lecture, Southeastern Analysis Meeting, University of Florida — March 2022
Title: Matricial Archimedean Order Unit Spaces and Quantum Correlations

21. Functional Analysis Seminar, University of California San Diego — February 2022
Title: Matricial Archimedean Order Unit Spaces and Quantum Correlations

20. Department of Mathematics & Statistics Colloquium, San José State University — September 2021
Title: From Correlation Sets to Tensor Products of C^*-algebras: The Connes-Kirchberg Problem

19. Expository Lecture Series, Groundwork for Operator Algebras Lecture Series (GOALS), — July 2021
Michigan State University, East Lansing, Michigan

    (a) Lecture 1: Completely Positive Maps and Applications
    (b) Lecture 2: Lance's Weak Expectation Property and Kirchberg's Conjecture

18. Special Session on Advances in Operator Algebras, Joint Mathematics Meeting — January 2021
Washington D.C.
Title: An Abstract Characterization for Projections in Operator Systems

17. Special Session: "If You Build It They Will Come": Presentations by Scholars in the National Alliance for Doctoral Studies in the Mathematical Sciences, Joint Mathematics Meeting, Washington D.C. — January 2021
    Title: A Look into the Abstract Theory of Operator Systems and Some Applications to Quantum Information Theory
16. Operator Theory Seminar, University of Iowa — November 2020
    Title: Projections in Operator Systems and Applications to Quantum Information Theory
15. East Coast Operator Algebras Symposium, University of Virginia — October 2020
    Title: Projections in Operator Systems and Applications to Quantum Information Theory
14. Mathematical Physics and Operator Algebras Seminar, Michigan State University — September 2020
    (a) Lecture 1: Operator Spaces and Operator Systems: An Exposition.
    (b) Lecture 2: An Abstract Characterization for Projections in Operator Systems.
13. Rings and Wings Seminar, Algebras and Rings in Colorado Springs Center (ARCS) University of Colorado at Colorado Springs — September 2020
    Title: An Abstract Characterization for Projections in Operator Systems
12. Oberseminar C^*-algebren, WWU Münster, — June 2020
    Title: An Abstract Characterization for Projections in Operator Systems
11. 2TART Conference, University of Florida — June 2020
    Title: An Abstract Characterization for Projections in Operator Systems
10. Operator Algebras Mini-Workshop, University of Virginia — March 2020
    Title: On Operator Systems Containing Symmetries
9. Quantitative Linear Algebra Reunion Conference at Lake Arrowhead, Institute for Pure and Applied Mathematics, University of California, Los Angeles — December 2019
    Title: Tensor Products and Categorical Properties of Matrix Convex Sets
8. Analysis Seminar, University of Illinois at Urbana-Champaign — October 2019
    Title: Matrix Convex Sets, Tensor Products, and Noncommutative Choquet Boundaries
7. Operator Theory Seminar, University of Virginia — October 2019
    Title: Matrix Convex Sets, Tensor Products, and Noncommutative Choquet Boundaries
6. Mathematics Colloquium, Sam Houston State University — March 2019
    Title: On Operator Spaces and Submaximality
5. Linear Analysis Seminar, Texas A&M — March 2019
    Title: On Operator Systems and Matrix Convexity
4. Quantitative Linear Algebra Culminating Workshop at Lake Arrowhead University of California, Los Angeles — June 2018
    Title: Lance's Weak Expectation Property and The Tensor Theory of Operator Systems
3. Quantitative Linear Algebra General Seminar Series, Institute for Pure and Applied Mathematics, University of California, Los Angeles — April 2018
    Title: Characterizations of Operator Systems Via Tensor Product Nuclearity Part II

2. Quantitative Linear Algebra General Seminar Series, Institute for Pure and Applied Mathematics, University of California, Los Angeles — April 2018
   Title: Characterizations of Operator Systems Via Tensor Product Nuclearity Part I

1. Department of Mathematics and Statistics Colloquium, San José State University — April 2015
   Title: C^*-Algebras and Real Operator Systems

Contributed

7. Invited Expository Lecture, SUPS (UG group in physics at university) — September 2023
   University of Illinois at Urbana-Champaign
   Title: Quantum Information Theory: My Perspective

6. Invited Expository Lecture, SigQuantum (UG group in quantum computing at university) — April 2023
   University of Illinois at Urbana-Champaign
   Title: Quantum Games and Their Tensors

5. Early Career Workshop in Operator Theory & Operator Algebras, Indiana University and Purdue University — February 2021
   Title: A Universal Representation for Quantum Commuting Correlations

4. Wabash Annual Mini-Conference, IUPUI, Indianapolis, IN — September 2019
   Title: Matrix Convex Sets, Tensor Products, and Noncommutative Choquet Boundaries

3. Graduate Research Day, Purdue University — November 2018
   Title: Lance's WEP and Operator System Nuclearity

2. Northern California Undergraduate Mathematics Conference, Saint Mary's College — March 2015
   Title: Real Operator Systems in M_n

1. American Mathematical Society Joint Mathematics Meetings, AMS Session on Functional Analysis — January 2015
   Title: Real Operator Systems in M_n

Conferences/Workshops Attended

37. Topological Quantum Error Correction and Quantum Gravity — November-December 2023
    Institute for Pure and Applied Mathematics, University of California, Los Angeles

36. Bridges Between Holographic Quantum Information and Quantum Gravity — November-December 2023
    Isaac Newton Institute for Mathematical Sciences, Cambridge

35. East Coast Operator Algebras Symposium — October 2023
    Purdue University, West Lafayette, Indiana

34. Recent Developments in Operator Algebras and Quantum Information Theory — September 2023
    AMS Fall Eastern Sectional, University at Buffalo (SUNY), Buffalo, NY

33. Analytical and Combinatorial Methods in Quantum Information Theory II — July 2023
    International Centre for Mathematical Sciences, Edinburgh, Scotland

32. Modified Gravity — May 2023
    Institute for Advanced Studies of the Universe, Institute for Condensed Matter Theory
    University of Illinois at Urbana-Champaign

31. Workshop III in Von Neumann Algebras and Geometric Group Theory — April 2023
    University of Iowa, Iowa City, Iowa

30. Functional Analysis and Quantum Information, Quantum Information Theory 2023 — March 2023
    Instituto de Ciencias Matemáticas, Madrid, Spain
29. Wabash Annual Mini-Conference, IUPUI, Indianapolis, IN — November 2022
28. QLA Meets QIT II, Illini Center, University of Illinois at Urbana-Champaign — November 2022
    Illinois Quantum Information Science and Technology Center
    Chicago Quantum Exchange
27. Operator Algebras, Dynamics, and Groups. ICM Satellite Conference — July 2022
    University of Copenhagen
26. Advancing Quantum Mechanics with Mathematics and Statistics, IPAM — March-June 2022
    University of California Los Angeles
    (a) Workshop IV: Monte Carlo and Machine Learning Approaches in Quantum Mechanics — May 2022
    (b) Workshop III: Large-scale Certified Numerical Methods in Quantum Mechanics — May 2022
    (c) Workshop II: Model Reduction in Quantum Mechanics — April 2022
    (d) Workshop I: Multiscale Approaches in Quantum Mechanics — March-April 2022
25. AMS Spring Central Sectional Meeting on "Recent Developments in Operator Algebras", Purdue University — March 2022
24. AMS Spring Southeastern Sectional Meeting on "Advances in Operator Algebras" — March 2022
    University of Virginia (Meeting Canceled)
23. Southeastern Analysis Meeting, University of Florida — March 2022
22. Groundwork for Operator Algebras Lecture Series, Michigan State University — July 2021
21. Early Career Workshop in Operator Theory & Operator Algebras — February 2021
    Indiana University and Purdue University
20. Entropy Inequalities, Quantum Information and Quantum Physics — February 2021
    Institute for Pure and Applied Mathematics, University of California, Los Angeles
19. Joint Mathematics Meeting, Washington D.C. — January 2021
18. East Coast Operator Algebras Symposium, University of Virginia — October 2020
17. Groundwork for Operator Algebras Lecture Series (GOALS) — June-July 2020
    Michigan State University
    (a) Groundwork for Operator Algebras Lecture Series (GOALS) Culminating Workshop — July 2020
16. Noncommutative Geometry and Operator Algebras Spring Institute — May 2020
    Vanderbilt University
15. Operator Algebras Mini-Workshop, University of Virginia — March 2020
14. Quantitative Linear Algebra Reunion Conference at Lake Arrowhead, Institute for Pure and Applied Mathematics, University of California, Los Angeles, USA — December 2019
13. QLA Meets QIT, Purdue University — November 2019
12. Classification Problems in von Neumann Algebras, Banff International Research Station for Mathematical Innovation and Discovery (BIRS) — September 2019
11. Wabash Mini-Conference, IUPUI — September 2019

10. Thematic Research Program: Operator Algebras, Groups and Applications to Quantum Information, Visiting Researcher, Instituto de Ciencias Matemáticas, Madrid, Spain — May 2019
    (a) Workshop II: Mathematical Aspects of Quantum Information Theory — May 2019
    (b) School II: Applications to Quantum Information Theory — May 2019
9. Brazos Analysis Seminar, University of Houston — March 2019
8. Wabash Mini-Conference, IUPUI — September 2018
7. Quantitative Linear Algebra, Visiting Scholar/Researcher, Institute for Pure and Applied Mathematics, University of California, Los Angeles — March-June 2018
    (a) Workshop IV: Quantitative Linear Algebra Culminating Workshop — June 2018
    (b) Workshop III: Random Matrices and Free Probability — May 2018
    (c) Workshop II: Approximation Properties in Operator Algebras and Ergodic Theory — May 2018
    (d) Workshop I: Expected Characteristic Polynomial Techniques and Applications — April 2018
6. Classification of Group von Neumann Algebras, American Institute of Mathematics, San Jose, California, USA — January 2018
5. Wabash Mini-Conference, IUPUI — September 2017
4. East Coast Operator Algebras Seminar, Loyola University — October 2016
3. Workshop on Non-Commutative Analysis, University of Iowa — June 2016
2. Great Plains Operator Theory Symposium, University of Illinois at Urban-Champaign — May 2016
1. East Coast Operator Algebras Seminar, University of Iowa — October 2015

Other Conferences Attended/Outreach

9. Panelist, Finding and Getting Jobs: A Panel Discussion Purdue University — April 2021
8. Q&A Moderator, Fields of Success, Stories from Math Alliance Alumni Math Alliance Field of Dreams Conference, Institute for Mathematics and its Applications, University of Minnesota (virtual) — November 2020
7. Panelist, Grad School Life, Career Paths in the Mathematical Sciences: An IMA/Math Alliance Workshop, Institute for Mathematics and its Applications, University of Minnesota, USA — July 2020
6. Panelist, Finding Your Focus in Graduate School: The Many Focuses of a Math Sciences PhD., Career Paths in the Mathematical Sciences: An IMA/Math Alliance Workshop, Institute for Mathematics and its Applications, University of Minnesota, USA — June 2019
5. Panelist, Maximizing Opportunities, Math Alliance Field of Dreams, St. Louis, USA — November 2018
4. Math Alliance Field of Dreams Conference, St. Louis, USA — November 2018
3. Latinos in the Mathematical Sciences, Institute for Pure and Applied Mathematics, University of California, Los Angeles — March 2018
2. Math Alliance Field of Dreams Conference, St. Louis, USA — November 2017
1. Math Alliance Field of Dreams Conference, St. Louis, USA — November 2016

Teaching

University of Illinois at Urbana-Champaign
5** are PhD. level courses, 49* are advanced courses/topics for undergraduates, and 492 courses are research semesters with undergraduates.

- Math 595: Introduction to Modular Theory — Spring 2024
- Math 490: Quantum Information Theory I: Quantum Channels and Error Correction (30 students) — Fall 2023
- Math 595: Operator Space Theory (10 students) — Spring 2023
- Math 492: Quantum Channels and Error Correction II (6 students) — Spring 2023
- Math 415: Applied Linear Algebra (60 students) — Spring 2023
- Math 492: Quantum Channels and Error Correction (8 students) — Fall 2022
- Math 415: Applied Linear Algebra (280 students) — Fall 2022
- Math 492: Select Topics in Quantum Information Theory (16 students) — Spring 2022
- Math 415: Applied Linear Algebra (280 students) — Spring 2022
- Math 125: Elementary Linear Algebra (80 students) — Fall 2021

Purdue University

- Math 16200 Plane Analytic Geometry And Calculus II (Recitation) — Summer 2021
- Math 16010 Applied Calculus 1 (Instructor) — Spring 2021
- Math 26100 Multivariate Calculus (Recitation) — Fall 2017
- Math 16600 Analytic Geometry and Calculus II (Recitation) — Spring 2017

Curriculum Development

University of Illinois at Urbana-Champaign

- Quantum Information Theory I: Quantum Channels and Error Correction (Undergraduate)
- Quantum Information Theory II: Quantum Channel Capacities (Undergraduate)

Advising

University of Illinois at Urbana-Champaign

Graduate

Undergraduate

- Tushar Mohan, Physics — August 2022-Current
- Jihong Cai, Mathematics — January 2022-Current
- Abraham Holtermann, Physics — January 2022-Current
- Yushan Chen — August 2022-May 2023
- Zeyuan Yu — August 2023-May 2023
- Chieh Hsu, Physics — May 2022-May 2023

Service

- Reviewer — April 2023-Current
  Mathematical Reviews, American Mathematical Society
- Scholarship Board Member, Sloan University Center of Exemplar Mentoring at Illinois — September 2021-Current
  University of Illinois at Urbana-Champaign
- Mentor, Sloan University Center of Exemplar Mentoring at Illinois — September 2021-Current
  University of Illinois at Urbana-Champaign
- Seminar Committee Member, Illinois Quantum Information Science and Technology Center (IQUIST), University of Illinois at Urbana-Champaign — August 2022-May 2023
- TA, Groundwork for Operator Algebras Lecture Series (GOALS) — June-July 2020
  Michigan State University

PhD Committee Member:

1. Peixue Wu, Mathematics, University of Illinois at Urbana-Champaign — April 2023

Preliminary Committee Member (Advancement to Candidacy):

2. Xuchen Cao, Physics, University of Illinois at Urbana-Champaign — December 2023
1. Haneul Kim, ECE, University of Illinois at Urbana-Champaign — December 2023

Conferences/Seminars Organized:

10. Co-Organizer (with Marius Junge and Felix Leditzky) — August 2021-Current
    Quantum Working Group Seminar
    University of Illinois at Urbana-Champaign
9. Co-Organizer (with Eric Chitambar, Marius Junge, Felix Leditzky, and Amanda Young) — July 2024
   Beyond IID in Information Theory 12
   University of Illinois at Urbana-Champaign
8. Co-Organizer (with Eric Chitambar, Paul Kwiat, and Virginia Lorenz) — August 2023
   IQUIST All-Hands Meeting 2023
   Illinois Quantum Information Science and Technology Center
   University of Illinois at Urbana-Champaign
7. Co-Organizer (with Marius Junge, Felix Leditzky and Thomas Sinclair) — November 2022
   QLA Meets QIT II
   University of Illinois at Urbana-Champaign, Illinois Quantum Information Science and Technology Center, Chicago Quantum Exchange
6. Co-Organizer (with Rolando de Santiago, Thomas Sinclair and Andrew Toms) — March 2022
   AMS Spring Central Sectional Meeting on "Recent Developments in Operator Algebras"
   Purdue University
5. Co-Organizer (with Thomas Sinclair), QLA Meets QIT — November 2019
   Purdue University
4. Co-Organizer (with Marius Dadarlat and Thomas Sinclair) — August 2019-May 2021
   Operator Algebras Seminar
   Purdue University
3. Organizer, Junior Operator Algebras Seminar — August 2018-May 2021
   Purdue University

2. Organizer, Quantitative Linear Algebra General Seminar Series — March 2018-June 2018
   Institute for Pure and Applied Mathematics
   University of California, Los Angeles

1. Organizer, Quantitative Linear Algebra Open Problem Session — March 2018-June 2018
   Institute for Pure and Applied Mathematics
   University of California, Los Angeles

Other:

- Graduate Student Representative — August 2017-May 2018
  Department of Mathematics, Purdue University
- Chapter President, Purdue University AMS Student Chapter — August 2017-May 2018
  Purdue University

References

- Marius Dadarlat, Professor of Mathematics, Purdue University,
  email: dadarlat [at] purdue [dot] edu
- Marius Junge, Professor of Mathematics, University of Illinois at Urbana-Champaign,
  email: mjunge [at] illinois [dot] edu
- Vern Paulsen, Professor Emeritus of Mathematics, University of Waterloo
  email: vpaulsen [at] uwaterloo [dot] ca
- Gilles Pisier, Professor Emeritus of Mathematics, Texas A&M, Professor Emeritus of Mathematics, Sorbonne Université,
  email: gilles [dot] pisier [at] imj-prg [dot] fr
- Bruce Reznick, Professor Emeritus of Mathematics, University of Illinois at Urbana-Champaign,
  email: reznick [at] illinois [dot] edu
  (teaching reference)
- Thomas J. Sinclair, Associate Professor of Mathematics, Purdue University,
  email: tsincla [at] purdue [dot] edu