Eric Lybrand

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Personal Website:
https://elybrand.github.io.

Education

- **University of California, San Diego** — San Diego, CA
  Ph.D. Mathematics — *2015 - 2020*
- **University of Georgia** — Athens, GA
  B.Sc. Mathematics — *2011 - 2015*

Teaching & Research Experience

- **CURE Graduate Assistant** — University of California, San Diego
  Graduate Research Assistant — *Summer 2017*
  - Supervised and worked alongside a group of 6 UCSD undergraduates on studying the empirical spectral distribution of banded random matrices. Faculty guidance and funding provided by Dr. Todd Kemp.
  - Results are being finalized for publication before the end of the 2017.
- **Teaching Assistant** — University of California, San Diego
  Graduate Teaching Assistant — *Fall 2015-Present*

  Honors Linear Algebra (MATH 31AH) . . . . . Fall 2017
  Honors Vector Calculus (MATH 31CH) . . . . . Spring 2017
  Honors Multivariable Calculus (MATH 31BH) . . . . . Winter 2017
  Honors Linear Algebra (MATH 31AH) . . . . . Fall 2016
  Calculus for Science and Engineering (MATH 20A) . . . . . Spring 2016
  Vector Calculus (MATH 20E) . . . . . Winter 2016
  Calculus for Science and Engineering (MATH 20B) . . . . . Fall 2015
- **Research Assistant** — University of California, San Diego
  Graduate Assistant — *Summer 2016*
  - Formulated and investigated conditions under which the kernel of a random Gaussian linear pencil misses a conical subset of a unit ball, thus generalizing the main result of Y. Gordon's "Escape Through the Mesh" result.
- **Undergraduate Research** — University of Georgia
  Research Assistant — *Summer 2014 - Fall 2015*
  - Proposed deterministic topological models for topoisomerase II that minimized knotting and average absolute linking number. Designed and analyzed numerical experiments on low crossing knot and link diagrams.
  - Implemented detection algorithms for generalized Reidemeister moves with sub-tangle structures in Python for Dr. Jason Cantarella's plCurve library.
  - Modified planar diagram embedding and drawing algorithms that preserved canonical labelings across the Spherogram and PLink libraries.

Skills

- Programming and Software
  - C++, Python, C, Mathematica, MATLAB, Java
- Other
  - Proficient Spanish-speaker

Awards, Grants & Honors

UCSD Senate Research Grant Award . . . . . Spring 2017
James B. Ax Graduate Fellowship 2015-16
Coursera Machine Learning Statement of Accomplishment . . . . . Spring 2015
Presidential Scholar 2014-2015
Eagle Scout . . . . . June 2008

Publications

Manuscripts in Preparation and Preprints

1. E. Lybrand and R. Saab. "Quantization for Low-Rank Matrix Recovery", Submitted, September 2017.

Presentations

- **Deterministic Models for Topoisomerase II**

  A brief survey of research done on deterministic models for Topisomerase II, an enzyme crucial in cell mitosis. These deterministic models assume that the enzyme operates with knowledge of local topological features of DNA crossings. Numerical results were presented to show how well these models perform compared to empirical results on Topoisomerase II. Given at UCSD on February 13, 2017.

- **Calculus of Variations**

  An introduction to the calculus of variations and the context in which the subject appears. Theorems such as Euler- Lagrange and the Fundamental Sufficiency Theorem were discussed and proven. A brief discussion of the finite element method was given at the end of the talk. Given at the University of Georgia on April 28th, 2014.

- **Differential Forms**

  An introduction to differential forms and how they may be used to detect the topology of a space. Topics covered included the reformulation of Stokes Theorem, the de Rham Cohomology, and proof of the Hairy Ball Theorem. Given at the University of Georgia on January 13th, 2014