

# Robert Y. Lewis

## CONTACT INFO

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## POSITIONS

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- 2018 – Present    **Vrije Universiteit Amsterdam**, The Netherlands  
Postdoc, Theoretical Computer Science  
Hired through the [Matryoshka](#) ERC Starting Grant
- 2012 – 2018    **Carnegie Mellon University**, Pittsburgh, PA, USA  
PhD, Pure and Applied Logic, 2018  
MS, Mathematics, 2015  
MS, Logic, Computation, and Methodology, 2014
- Summer 2016    **Wolfram Research**, Champaign, IL, USA  
Intern, Mathematica Algorithms R&D
- Summer 2015    **University of Newcastle**, NSW, Australia  
Visiting student, [CARMA](#) Priority Research Centre
- 2010 – 2012    **St. Agnes Academy**, Houston, TX, USA  
Secondary School Teacher  
10<sup>th</sup> grade geometry, 11<sup>th</sup> and 12<sup>th</sup> grade pre-calculus, 12<sup>th</sup> grade AP Calculus AB
- 2006 – 2010    **Rice University**, Houston, TX, USA  
BA, Mathematics and Philosophy

## PEER REVIEWED PUBLICATIONS

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### **Formalizing the solution to the cap set problem.**

Sander Dahmen, Johannes Hölzl, and Robert Y. Lewis.

In Harrison, J., O’Leary, J., and Tolmach, A., eds., *Interactive Theorem Proving* (ITP 2019), pp. 15:1-15:19. 2019.

### **A formal proof of Hensel’s lemma over the $p$ -adic integers.**

Robert Y. Lewis.

In Mahboubi, A., Myreen, M. O., eds., *8th ACM SIGPLAN International Conference on Certified Programs and Proofs* (CPP 2019), pp. 15-26. 2019.

### **An extensible ad hoc interface between Lean and Mathematica.**

Robert Y. Lewis.

In Dubois, C. and Paleo, B. W. eds., *Proof eXchange for Theorem Proving 2017* (EPTCS), pp. 23-38. 2017.

### **A heuristic prover for real inequalities.** Journal version.

Jeremy Avigad, Robert Y. Lewis, and Cody Roux.

*Journal of Automated Reasoning* 56(3), pp. 367-386. 2016.

**A heuristic prover for real inequalities.**

Jeremy Avigad, Robert Y. Lewis, and Cody Roux.

In Klein, G. and Gamboa, R., eds., *Interactive Theorem Proving* (ITP 2014), pp. 61-76. 2014.

**Energy-minimizing unit vector fields.**

Leobardo Rosales, Robert Y. Lewis, et al.

*Involve* 3(4), pp. 435-450. 2010.

## BOOKS, THESES, AND DRAFTS

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**The Lean mathematical library.** Submitted.

This paper describes a community effort and is submitted under a collective name. I am a maintainer of the project and wrote much of this paper.

**A bi-directional extensible ad hoc interface between Lean and Mathematica.** Draft.

Robert Y. Lewis and Minchao Wu.

**Logic and Proof.** A textbook using the Lean theorem prover.

Jeremy Avigad, Robert Y. Lewis, and Floris van Doorn.

Available freely in [interactive](#) and [static](#) versions.

**Two Tools for Formalizing Mathematical Proofs.** Dissertation.

Robert Y. Lewis.

Certified Feb 16, 2018.

**Polya: A Heuristic Procedure for Reasoning with Real Inequalities.** MS thesis.

Robert Y. Lewis.

Certified Dec 11, 2014.

## SELECTED PRESENTATIONS

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**Formalizing the solution to the cap set problem.**

- [ITP 2019: Interactive Theorem Proving](#), Portland, OR, USA. 09/2019.
- [Vietnam-USA Joint Mathematical Meeting](#), Quy Nhon, Vietnam. 06/2019.
- [CARMA Workshop on Computer-Aided Proof](#), Newcastle, NSW, Australia. 06/2019. (Invited speaker.)

**A formal proof of Hensel's lemma over the  $p$ -adic integers.**

- [CPP 2019: Certified Programs and Proofs](#), Cascais, Portugal. 01/2019.
- [Lean Together 2019](#), Amsterdam, The Netherlands. 01/2019.

**A heuristic method for formally verifying real inequalities.**

- [Matryoshka 2018](#), Amsterdam, The Netherlands. 06/2018.
- [Hales60](#), Pittsburgh, PA, USA. 06/2018. (Invited speaker.)

**Toward AI for Lean, via metaprogramming.**

- [AITP 2018: Artificial Intelligence in Theorem Proving](#), Aussois, France. 03/2018.

**The Lean theorem prover, for mathematicians.**

- Western University Mathematics Dept. Foundations Seminar, London, ON, Canada. 12/2017.

**An extensible ad hoc interface between Lean and Mathematica.**

- [ICMS 2018: International Congress on Mathematical Software](#), South Bend, IN, USA. 07/2018.
- [PxTP 2017: Proof eXchange for Theorem Proving](#), Brasília, Brazil. 09/2017.
- [Wolfram Technology Conference](#), Champaign, IL, USA. 10/2016.

### Automation and computation in the Lean theorem prover.

- [HaTT: Hammers for Type Theory](#), IJCAR, Coimbra, Portugal. 07/2016.
- [AITP 2016: Artificial Intelligence in Theorem Proving](#), Obergurgl, Austria. 04/2016.
- TU München Logic and Verification Seminar, Munich, Germany. 03/2016.

### Algebra and analysis in the Lean theorem prover.

- [MAP 2016: Effective Analysis](#), Marseille, France. 01/2016.

### Dependent types and the algebraic hierarchy.

- [Workshop on Mathematics and Computation](#), Newcastle, NSW, Australia. 06/2015.

### A heuristic prover for real inequalities.

- [ITP 2014: Interactive Theorem Proving](#), Vienna, Austria. 07/2014.
- [6th Podlasie Conference on Mathematics](#), Bialystok, Poland. 07/2014.
- CMU Graduate Research Sharing Forum, Pittsburgh, PA. 12/2013.

### Computers in mathematics: automated and interactive proofs.

- CMU Summer School in Logic and Formal Epistemology, Pittsburgh, PA. 06/2014.

### Energy-minimizing vector fields of unit length.

- Rice University VIGRE Summer Seminar, Houston, TX. 07/2009.

## TEACHING

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Spring 2020	<b>Logic and Modeling</b> (VU, instructor)
Spring 2019	<b>Logic and Modeling</b> (VU, instructor)
Spring 2018	<b>Logic and Modeling</b> (VU, teaching assistant)
Fall 2016	<b>Logic and Mathematical Inquiry</b> (CMU, instructor)
Spring 2015	<b>Nature of Mathematical Reasoning</b> (CMU, instructor)
Fall 2014	<b>Models and Methods of Optimization</b> (CMU, teaching assistant)
Summer 2014	<b>Nature of Mathematical Reasoning</b> (CMU, instructor)
Spring 2014	<b>Undecidability and Incompleteness</b> (CMU, grader and guest lecturer)
Fall 2013	<b>Formal Logic</b> (CMU, grader and guest lecturer)
2010 – 2012	<b>Geometry, Pre-calculus, AP Calculus AB</b> (St. Agnes Academy, instructor)
2007 – 2010	<b>Honors Calculus III/IV, Honors Linear Algebra</b> (Rice, grader)

## STUDENTS

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All students at VU Amsterdam.

2019	Kevin Kappelmann (MS intern)
2019	Paul-Nicolas Madelaine (MS intern)
2018 – 2019	Markos Dermitzakis (BS thesis)
2018 – 2019	Phillip Lippe (MS research assistant)
2018 – 2019	Miko Kuijn (MS thesis)
2018	Pablo Le Hénaff (MS intern)

## AWARDS, GRANTS, AND HONORS

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2019 – 2023	Senior Collaborator, <a href="#">Lean Forward</a> NWO Vidi grant
2017	<a href="#">Laboratory of Symbolic and Educational Computation</a> research fellowship
2017	<a href="#">Future Faculty</a> , Eberly Center for Teaching Excellence & Educational Innovation
2015 – 2016	William S. Dietrich II <a href="#">Presidential PhD Fellowship</a>
2014	Honorable Mention, NSF Graduate Research Fellowship Program

## SERVICE

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- 2020 Organizer, [Formal Methods in Mathematics / Lean Together](#) workshop
- 2019 – Maintainer, Lean [mathlib](#) library
- 2019 Organizer, [Lean Together](#) workshop
- 2018 Organizer, [ICMS](#) session on [Formal and Informal Mathematical Corpora](#)
- 2018 [Artificial Intelligence and Symbolic Computation](#) Conference Program Committee
- 2015, 2016 CMU Philosophy Dept. Graduate Admissions Committee
- 2015 CMU Philosophy Dept. 30<sup>th</sup> Anniversary Conference Planning Committee
- 2014 – 2018 Founding member, CMU chapter of [Minorities and Philosophy](#)
- 2013 – 2017 Organizer, CMU Philosophy Dept. Graduate Research Sharing Forum
- 2011 – 2012 Coach and sponsor, St. Agnes Academy Engineering/Robotics Team
- 2008 – 2010 Coordinator and tutor, SRC Society of Academic Fellows, Rice University