

# Robert Y. Lewis

## Contact Info

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## Positions

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2018 – 2020	<b>Vrije Universiteit Amsterdam</b> , The Netherlands Postdoc, Theoretical Computer Science <a href="#">Matryoshka</a> project
2012 – 2018	<b>Carnegie Mellon University</b> , Pittsburgh, PA, USA PhD, Pure and Applied Logic, 2018 MS, Mathematics, 2015 MS, Logic, Computation, and Methodology, 2014 Supervisor: Jeremy Avigad
Summer 2016	<b>Wolfram Research</b> , Champaign, IL, USA Intern, Mathematica Algorithms R&D
Summer 2015	<b>University of Newcastle</b> , NSW, Australia Visiting student, <a href="#">CARMA</a> Priority Research Centre
2010 – 2012	<b>St. Agnes Academy</b> , 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	<b>Rice University</b> , Houston, TX, USA BA, Mathematics and Philosophy

## Peer Reviewed Publications

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### **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), 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* 2014 (Springer LNCS).

### **Energy-minimizing unit vector fields.**

Leobardo Rosales, Robert Y. Lewis, et al.

*Involve* 3(4), 2010.

## **Books and Drafts**

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### **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.

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

Robert Y. Lewis and Minchao Wu.

In preparation.

## **Selected Presentations**

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

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

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

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

- [Hammers for Type Theory workshop](#), 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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All courses at Carnegie Mellon University, unless otherwise indicated.

Spring 2019	<b>Logic and Modeling</b> (VU, instructor)
Spring 2018	<b>Logic and Modeling</b> (VU, teaching assistant)
Fall 2016	80-211, <b>Logic and Mathematical Inquiry</b> (instructor)
Spring 2015	80-110, <b>Nature of Mathematical Reasoning</b> (instructor)
Fall 2014	21-257, <b>Models and Methods of Optimization</b> (teaching assistant)
Summer 2014	80-110, <b>Nature of Mathematical Reasoning</b> (instructor)
Spring 2014	80-311, <b>Undecidability and Incompleteness</b> (grader and guest lecturer)
Fall 2013	80-610, <b>Formal Logic</b> (grader and guest lecturer)
2010 – 2012	<b>Geometry, Pre-calculus, AP Calculus AB</b> (St. Agnes Academy, instructor)
2007 – 2010	MATH 221/222/354, <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	Pablo Le Hénaff (MS intern)
2018	Miko Kuijn (MS thesis)

## Service

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2019	Organizer, <a href="#">Lean Together</a> workshop
2018	Organizer, ICMS session on <a href="#">Formal and Informal Mathematical Corpora</a>
2018	<a href="#">Artificial Intelligence and Symbolic Computation</a> 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 <a href="#">Minorities and Philosophy</a>
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

## 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