

## Hamed Mousavi

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## 1 Education

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### Ph.D. Mathematics

2017-2022

(expected)

*Georgia Institute of Technology, Atlanta, USA.*

Area: Harmonic Analysis and Number theory

Thesis advisor: [Dr Ernie Croot](#)

Dissertation Research: Prime numbers and discrete harmonic analysis.

### M.S. Mathematics

2017-2019

*Georgia Institute of Technology, Atlanta, USA.*

Area: Number theory

Advisor: [Dr Ernie Croot](#)

### M.S. Mathematics

2016-2017

*Sabanci University, Istanbul, Turkey.*

Area: Theory of Partitions

Thesis advisor: [Dr Kagan Kursonguz](#)

Thesis Research: The Hardy-Ramanujan-Rademacher expansion for the partition function and its extensions.

### M.S. Mathematics (Non-Thesis)

2015-2016

*Tarbiat Modares University, Tehran, Iran.*

Area: Number Theory.

Supervisor: [Dr. Ali Rajaei](#)

### M.S. Communication Engineering

2013-2015

*Shiraz University of Technology, Shiraz, Iran.*

Area: Source and Channel Coding

Thesis advisor: [Dr. Javad Haghighat](#)

Thesis research: Performance Study of Wireless Sensor Networks in Correlated Fading Channels.

### B.S. Mathematics

2008-2013

*Shiraz University, Shiraz, Iran.*

## 2 Scholarship and Creative Activities

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### 2.1 Research interests

- Primary Research Interests

Analytic Number Theory, Discrete Harmonic Analysis, Additive Number Theory.

- Other Research Interest

$q$ -series and Theta functions, Theory of Partitions, Random Matrices and Moments of Zeta Functions, Theory of Smooth Numbers, Algebraic Coding Theory, Applications of Cryptography, Wireless Sensor Networks, Source Coding.

## 2.2 Selected Papers

For complete list of papers, please check my [Google Scholar page](#).

- Croot. E, Mousavi. H, “On a Class of Sums With Unexpectedly High Cancellation, and Its Applications”. Submitted. 2021. [arxiv.org/pdf/1909.12470.pdf](https://arxiv.org/pdf/1909.12470.pdf)
- Lacey. M, Mousavi. H, Rahimi. Y, “Endpoint  $\ell^p$ –Improving Estimates For Prime Averages”. **Math Research Letters** 2021. [arxiv.org/pdf/2101.10401.pdf](https://arxiv.org/pdf/2101.10401.pdf)
- Mousavi. H, Schmidt. M, “Factorization Theorems for Relatively Prime Divisor Sums, GCD Sums and Generalized Ramanujan Sums”. **The Ramanujan Journal** 2021. <https://arxiv.org/pdf/1810.08373.pdf>
- Mousavi. H, Padashnik. F, Qureshi. A, “On Reduced Archimedean Skew Power Series Rings”. **Journal of Algebra and its Applications** 2020. <https://arxiv.org/pdf/2009.01473.pdf>.
- Dastbasteh. R, Mousavi. H, Abualrub. T, Haghighat. J, Aydin. N, “Characterization of the Skew Cyclic Codes Over  $F_p + uF_p$ ”. **International Journal of Information and Coding Theory** 2018. <https://arxiv.org/pdf/1712.07783.pdf>
- Mousavi. H, Ahmadi. B, Rahimi. S, “A New Approach to Decrease the Computational Complexity of E-Voting Protocols”. **Transactions on Emerging Telecommunications Technologies** 2017. <https://onlinelibrary.wiley.com/doi/pdf/10.1002/ett.3140>
- Mousavi. H, Haghighat. J, Hamuda. W, DastBaste. R, “Analysis of a Subset Selection Scheme for Wireless Sensor Networks in Time-Varying Fading Channels”. **IEEE Transaction on Signal Processing** 2016. <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7373679>
- Mousavi. H, Haghighat. J, Hamuda. W, “A Relay Subset Selection Scheme for Wireless Sensor Networks Based on Channel State Information”. **IEEE International Conference on Communications (ICC)** 2016. Malaysia. <https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7511526>

## 2.3 Works in Progress

- Monomial Carleson Operators With Arithmetic Weight. With M, Lacey, and B, Krause.
- Improving and Maximal Inequalities for Primes in Progression. With M, Lacey, Y, Rahimi, and C, Giannitsi.
- Improving Inequalities for Gaussian Primes, with M, Lacey.
- On a problem of Graham, Erdos, and Pomerance on the  $p$ -divisibility of Central Binomial Coefficients, with Ernie Croot.
- An Exact Formula for the Number of Partitions With Parts of the Form  $pt + a$ .
- On the Structure of Primary Ideals of a Non-Laskerian Group Ring. With R, Dastbasteh.

## 2.4 Selected Talks

For complete list of talks, please visit my [Webpage](#).

- Chain Conditions over Power Series and Polynomial Rings, Algebraic Geometric Student Seminar, Georgia Tech(Virtual), Atlanta, USA, 2021.
- A Class of Sums With Unexpectedly High Cancellations, Combinatorial and Additive Number Theory(CANT), CUNY Graduate Center(Virtual)New York, USA, 2020.
- On a Class of Sums with Unexpectedly high Cancellation and PTE Problems, ACO Seminar, Georgia Tech, Atlanta, USA, 2019.
- Pentagonal Number Theorem and Zeroes of Riemann Zeta Function, The Legacy of Ramanujan and in honor of Bruce Berndt's 80th birthday, University of Illinois at Urbana Champaign, Illinois, USA, 2019.
- A Homomorphic E-Voting Protocol Based on El-Gamal Cryptosystem, Women In STEM Conference, Georgia State University, Atlanta, USA, 2019.
- Number of Partitions with Parts of the Form  $pt + a$ , Integers Conference, Augusta, USA, 2018.
- The Hardy-Ramanujan-Rademacher expansion for the partition function and its extensions, Master's defense, Sabanci University, Istanbul, Turkey, 2017.
- Skew Cyclic Codes. Algebraic coding seminars, Sabanci University, Istanbul, Turkey, 2017.
- Performance Study of Wireless Sensor Networks in Correlated Fading Channels, Shiraz Tech, Shiraz, Iran, 2015.

## 2.5 Related Events

- Participation in a conference in honor of George Andrew's 80th birthday, Penn State university, State college, Pensilvania, USA, 2018.
- Spring School on Analytic Number Theory, IPM, Tehran, Iran, 2016.
- Participated in Iranian Workshop on Communication and Information Theory(IWCIT), Tehran. Iran, 2014.

## 2.6 Computer Projects

Skills (Competent): PARI, MatLab, Python, Mathematica.

- Evaluate Retinopathy Grade Regarding Eye Fundus Images Using Biomarkers, with H, Gatewood. K, Sigurjonsson. Z, Chong. "Classical biomarker extraction, Support Vector Machine, and deep learning". Georgia Tech. 2021.
- Classifying Emotional Expressions in Speech using Ensemble Learning, with M, Chan. M, Frounchi. S, Gharebaghi. H, Tekgul. "Feature extraction, Support vector Machines, and deep learning methods". Georgia Tech. 2020.
- Implication of Support Vector Regression using Scikit-learn dataset. "Computations and designing a SVR method". Georgia Tech. Atlanta, USA, 2020
- Federlist Papers Using fedpapers-split.txt. "The role of Laplace Smoothing in Naive Bayes classifier". Georgia Tech. Atlanta, USA, 2020.

- Sensor Selection method Simulation for a Wireless Sensor Network with Gilbert-Elliot Channel. “The simulation a channel and demonstrating a Subset selection Algorithm”. Shiraz University of Technology. Shiraz, Iran, 2015.

## 3 Teaching and Mentorships

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### 3.1 Teaching

- **Graduate Student Instructor** (Instructor of records)
  - Integral Calculus (Online), Georgia Tech, Summer 2021.  
Description: Twice a week lecture, Managing one teaching assistant, 30 students, Proctoring and grading, Syllabus design, Meeting other instructors, Office hours.
- **Head Teaching Assistant**
  - Differential Equations (in person), Georgia Tech, Summer 2019 .  
Description: Creating instructional videos, Design the worksheets, Office hours, Grading the projects, Supporting the teaching assistants.
- **Teaching Assistant**  
Description: Studios (recitations), Office hours, Proctoring and grading, Observing students in teams, Review sessions.
  - Multivariable Calculus: Spring 2020(Georgia Tech, online), Fall 2019 (Georgia Tech, hybrid).
  - Differential Equations: Spring 2021(Georgia Tech, online), Spring 2019 (Georgia Tech, in person), Spring 2018 (Georgia Tech, in person), Summer 2018 (Georgia Tech, in person).
  - Discrete Math: Spring 2017(Sabanci, in person).
  - Linear Algebra: Fall 2020 (Georgia Tech, online), Summer 2020 (Georgia Tech, online), Fall 2018 (Georgia Tech, in person), Fall 2016 (Sabanci, in person).
  - Commutative Algebra (Graduate Course): Spring 2016 (Tarbiat Modarres, in person).
  - Advanced Algebra (Graduate Course): Fall 2015 (Tarbiat Modarres, in person), Fall 2014 (Shiraz, in person), Fall 2013 (Shiraz Tech, in person).
  - Mathematics Analysis III: Spring 2014 (Shiraz, in person).
  - Mathematics Engineering: Fall 2013 (Shiraz Tech, in person).
  - Algebra II: Spring 2011 (Shiraz, in person).
  - Elementary Analysis: Fall 2010 (Shiraz, in person).
  - Number theory: Fall 2010 (Shiraz, in person).
- **Olympiad Coaching**
  - Numerical Analysis, Problem solving workshop, Shiraz university, Shiraz, Iran, 2013.
  - Algebra, preparation for national math Olympiad. Shiraz University, Shiraz, Iran, 2014.
  - Several Number Theory Workshops for Highschool National Mathematics Olympiad. Nodet1 highschool (2010-2013), Nodet2 highschool(2009-2011), Tohid highschool (2010-2012).
- Instructor of a Two-week Calculus Mini-course for M.S. National Entrance Exam. Shiraz University, Shiraz, Iran, 2013.
- Grader of the courses Complex Analysis, Real Analysis, Discrete Mathematics, Number Theory, Georgia Tech, Atlanta, USA, 2018-2020.

### 3.2 Mentorship and Consultations

- Math Olympiad and Competitions Mentorships. Duties: Performance Review, Consultation.
  - Yaaghoub Rahimi: A national gold medal (2012) and a Bronze medal in the International Math Competition IMC 2013.
  - Reza Dastbasteh: A national Bronze medal 2014.
  - Ali Akbar Hossieni: A national Gold medal 2015.
- Coaching more than 10 undergraduate students to prepare for national graduate exam.
- Research mentorship (informally) for Farzad Padashnik, Result of the project: 2 papers in algebra (see <https://www.koreascience.or.kr/article/JAK0201914439301396.pdf> for example).

## 4 Awards and Honors

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- Awards
  - Research Assistant supported by NSF Grant (M, Lacey. DMS-1949206), Georgia Tech, USA, Fall 2021.
  - Research prize supported by NSF Grant (M, Lacey), \$1500, Georgia Tech, USA, 2020.
  - Travel fund for the Legacy of Ramanujan conference, \$520, UIUC, USA, 2018.
  - Travel fund for the Integers conference, \$400, Augusta, USA, 2018.
  - Top 3 Researcher Students (Gursel Award), \$800, Sabanci University, Turkey, 2017.
  - Awarded NEFI (National Elite Foundation of Iran) gifted prize, \$4000, Iran, 2014- 2015.
- Honors
  - Gold medal in 36th Iranian Mathematics competition for university students, Iranian math society, 2012.
  - Silver Medal in 17th International Mathematic Olympiad for university students, Iranian math society, 2013.

## 5 Service and Memberships

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### 5.1 Professional Contributions

- Reviewer of Mathematica moravica.
- Evaluation of applications for President's Undergraduate Research Awards (PURA). Georgia Tech. 2019-2020.
- Member of scientific committee in 40th Iranian Math competition for university student in summer 2016.
- Co-leader of Shiraz university team for national math competition, Iranian math society, Kerman, Iran, 2014.

## **5.2 Professional Memberships**

- Member of American Mathematics Society, Since 2017
- Member of National Elites Foundation of Iran. 2013-2016.
- Member of Brilliant Talent of Shiraz University of Technology. 2013-2016.
- Member of National Organization for Development of Exceptional Talents (NODET) for secondary and high school students. 2001-2008.

## **5.3 Public and Community Service**

- Scientific member of “Question for sale” workshop. 8th break time meeting in Shiraz university of technology. Iran. (2015).
- Executive member of week of mathematics workshop. Shiraz university, Shiraz, Iran, 2013-2014.
- Member of Committee for Instructor Opinion Surveys. Preparation of questions of surveys and statistical results extraction the of the survey, 2013-2015.