Karuna Sangam

PhD Candidate

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Education

Current	**PhD in Mathematics**, *Rutgers University*, New Brunswick, NJ Activities: Treasurer for AMS Graduate Chapter 2018-19.
Oct 2023	**MS in Mathematics**, *Rutgers University*, New Brunswick, NJ
May 2018	**BA in Mathematics**, *Bard College*, Annandale-on-Hudson, NY Activities: Student Government, Swim & Dive team.

Undergraduate Thesis

Title	*Homeomorphisms of the Sierpiński Carpet*
Advisor	James Belk
Description	In this project, I studied self-homeomorphisms of the Sierpiński carpet. In particular, I identified its finite subgroups and attempted to define a transducer homeomorphism of the carpet.

Honors

May 2017	**Kenneth Bush Memorial Scholar in Mathematics**, *Bard College* A scholarship given annually in memory of distinguished mathematician Kenneth A. Bush '36 to a junior who has demonstrated excellence in mathematics.

Work Experience

Teaching

Sep 2023–Current	**Part-Time Lecturer**, *Rutgers University*, New Brunswick, NJ Instructor of Record for Math 111 (pre-calculus) and Recitation Instructor for Math 251 (multi-variable calculus).
Jul 2023–Current	**Math Instructor**, *Art of Problem Solving Academy*, Princeton, NJ Worked as summer camp instructor for Math Beast Camp 6, introducing students to pre-algebra concepts and graph theory. Serving as instructor for Middle and High School Contest Math Courses in the fall.
Sep 2018–May 2023	**Graduate Teaching Assistant**, *Rutgers University*, New Brunswick, NJ As tutor in the Math Help Center: Worked as a drop-in tutor at tutoring center, primarily working with students in 100- and 200-level courses, but occasionally helping with higher level material as well. As TA for a course: Led recitation sections for various undergraduate courses, including single- and multi-variable calculus, linear algebra, and real analysis. Held weekly office hours for students to seek help. Graded student work. Have experience both online and in-person.

Jun– Aug 2020	**Summer Lecturer**, *Rutgers University*, New Brunswick, NJ Served as Instructor of Record for Math 251 (multi-variable calculus) online. Conducted lectures and recitation sections, wrote quizzes and exams, held oral exams in order to gauge understanding of material in the online format.
Sep 2015– Dec 2017	**Math Tutor**, *Bard College*, Annandale-on-Hudson, NY Monitored the math study room, which is a space available for students to study math on weeknights. Assisted students who requested help. Worked as the dedicated tutor for an Abstract Algebra class, offering weekly office hours as well as one-on-one tutoring sessions for students who requested it.
Jan–Jun 2014	**Math Tutor**, *De Anza College*, Cupertino, CA Helped students in need of additional help in beginning algebra through precalculus. Tutored on both a weekly individual and a drop-in basis. Guided one-on-one students through areas of challenge.

Research

May– Aug 2017	**Research Assistant**, *University of Connecticut*, Storrs, CT Supported by the NSF through their REU program. Conducted research on the existence and continuity of gradients on generalizations of the Sierpiński Gasket. Presented research in a talk at the Young Mathematicians Conference 2017 at Ohio State University.
Jun–Jul 2016	**Research Assistant**, *Bard College*, Annandale-on-Hudson, NY Assisted in research on finding module bases for integer generalized splines. Presented research in a poster session at Summer Combo 2016 in Vermont, hosted by Saint Michael's College. Gave a brief talk at the Garden State Undergraduate Math Conference 2017, hosted by The College of New Jersey.

Miscellaneous

Sep 2015– May 2016	**Lifeguard and Swim Instructor**, *Bard College*, Annandale-on-Hudson, NY Worked as a lifeguard and a swim instructor at the athletic center at Bard College.

Past Teaching

Summer 2023	**MBC 6**, *AoPS Academy*, Princeton, NJ Summer Camp Instructor for Math Beast Camp 6 (Prealgebra Prep).
Spring 2022	**Math 151**, *Rutgers University*, New Brunswick, NJ Workshop Instructor for Math 151 (Calculus I for Physical Sciences and Engineering).
Fall 2021	**Math 311**, *Rutgers University*, New Brunswick, NJ Recitation Instructor for Math 311 (Intro to Real Analysis).
Fall 2021	**Math 250**, *Rutgers University*, New Brunswick, NJ TA at Large for Math 250 (Intro to Linear Algebra).
Spring 2021	**Math 250**, *Rutgers University*, New Brunswick, NJ TA at Large for Math 250.
Fall 2020	**Math 152**, *Rutgers University*, New Brunswick, NJ Workshop Instructor for Math 152 (Calculus II for Physical Sciences and Engineering).
Summer 2020	**Math 251**, *Rutgers University*, New Brunswick, NJ Instructor of Record for Math 251 (Multi-Variable Calculus).
Spring 2020	**Math 251**, *Rutgers University*, New Brunswick, NJ Recitation Instructor for Math 251.

Fall 2019	**Math 135**, *Rutgers University*, New Brunswick, NJ Recitation Instructor for Math 135 (Calculus I for Life/Social Sciences).

Mathematics

Research	Knot theory, analysis on fractals, geometric group theory/fractal geometry, integer generalized splines.
Graduate	Real analysis, complex analysis, functional analysis, abstract algebra, algebraic topology, differential geometry.
Undergraduate	Combinatorics, hypergraph theory, dynamical systems, probability.

Computer Science/Programming

Languages	Python, SageMath, LATEX, Java, Mathematica, HTML/CSS, Javascript.
OS	Ubuntu, MacOS.
Misc.	Some experience with machine learning and data science.

Languages

English	Native fluency	Tamil	Conversational fluency
French	Rudimentary	Hungarian	Rudimentary

Interests

Music	Composition, songwriting, voice, piano, guitar.
Crafts	Knitting, spinning, bookbinding, embroidery, painting.
Outdoors	Hiking, camping, backpacking, swimming, canoeing/kayaking.

References

[1] Luke Brown, Giovanni Ferrer, Gamal Mograby, Luke G. Rogers, and Karuna Sangam. Harmonic gradients on higher-dimensional Sierpiński gaskets. *Fractals*, 28(06):2050108, Sep 2020.

[2] Karuna Sangam. Homeomorphisms of the Sierpiński carpet. Bachelor's thesis, Bard College, 2018.