Mark Rhee

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EDUCATION

University of California, Berkeley | Berkeley, California **May 2028**

B.A. in Applied Mathematics, intended double major in Computer Science | GPA: 3.974 / 4.0

Relevant Courses: Probability and Random Processes, Data Structures, Structure & Interpretation of Programs, Data Science, Computer Architecture, Honors Linear Algebra, Honors Real Analysis, Discrete Mathematics, Multivariable Calculus

Activities: Math Dept. Directed Reading Program, Korean American Basketball Association (Officer), Computer Science Mentors

TECHNICAL SKILLS

Languages: Python, C, Java, SQL, LaTeX
Technologies: PyTorch, NumPy, JAX, Matplotlib, Git
Tools: Google Colab, Jupyter, Vim, VS Code, Unix CLI

EXPERIENCE

Redwood Center for Theoretical Neuroscience | Berkeley, California **August 2025 - Present**
- Implemented experiments in JAX analyzing the Muon optimizer on synthetic word embedding tasks
- Working on analytically characterizing Muon training phases, specifically modeling subspace alignment and linear singular value growth to explain spectral bias in deep linear networks
- Investigating convergence behavior at the *edge of stability* to derive maximum learning rate bounds and quantify speedups relative to vanilla Gradient Descent

UC Berkeley EECS Department | Berkeley, California **September 2025 - December 2025**
CS 61C Academic Intern
- Supported students in Computer Architecture course through office hours focused on labs and homework
- Provided one-on-one debugging and conceptual guidance on topics including caching, pipelining, and parallelism

PROJECTS

Generalization Capabilities of Neural Network Substructures | Python, PyTorch, Matplotlib **July 2025**
- Implemented sparse subnetwork training framework in PyTorch to evaluate Zhang et al.'s *functional lottery ticket hypothesis* on the MNIST-1D dataset
- Automated large-scale retraining (8000+ iterations per model) and visualized results using reproducible pipelines

mrkdh16.github.io/markedown | Quartz, Obsidian, NPX **April 2025 - Present**
- Maintaining a public blog synthesizing ideas across mathematics, physics, computer science, and philosophy
- Hosted with Github Pages, deployed with Obsidian and Quartz

NBA Shot Prediction | Python, NumPy, PyTorch **December 2024**
- Built predictive models for NBA shot success using Kaggle shot log data (128k shots)
- Achieved 64% accuracy / 66% AUC with optimized neural nets (~15% improvement over existing models)

HONORS

Aime Qualifier **March 2024**
- Top ~5% in AMC 12 (American Mathematics Competition)