Corey James Predella

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◇1 Education

Carnegie Mellon University, B.A. Mathematics, 2023-2027
Societies: Dean's list with high honors, CMU Honors math student, CMIMC problem-writer, Math club, Chess club
Major GPA: 4.0/4.0
GPA: 3.76/4.0

Beaver Country Day School (Cum Laude), 2018-2022
Societies: Upper school president, student government, competetive programming team founder & head, physics club president
Awards & Honors: Alex Cohn Grant recipient, Faculty prize recipient, Mente et Manu prize recipient, Cum Laude Society, High Honor roll, TEDx event speaker, SAT math perfect score
GPA: 4.2/4.0

◇2 Work Experience

TA & Substitute Instructor, AwesomeMath Summer Program: May 2023 - August 2023

- Assisted in training students for top-tier math contests like AIME and USAMO.

- Conducted problem-solving workshops, providing strategic hints and solutions.

- Evaluated and provided constructive feedback on proof-based assignments and exams.

- Facilitated online forums and office hours, clarifying complex mathematical concepts.

- Monitored and recorded student academic progress and attendance.

Teacher, NuVu Innovation School: August 2022 - June 2023

- Collaboratively designed and co-taught innovative, seminar-style courses, integrating interdisciplinary approaches to enhance student learning experiences.

- Led the creation of dynamic, project-based learning modules, tailored to foster critical thinking and problem-solving skills among students.

- Implemented effective teaching strategies to facilitate a deeper understanding of complex concepts, ensuring a high level of student engagement and academic achievement.

Research Intern, Cardiovascular Engineering Inc: May 2022 - August 2022

- Conducted in-depth, computational research in cardiology, photoplethysmography, and arterial blood pressure.

- Developed an AI deep learning model using TensorFlow 2.0, NumPy, and Scipy to predict arterial blood pressure waveforms from photoplethysmographic data.

- Innovated U-networks, W-networks, and Ladder-networks to enhance accuracy in waveform convolution processes.

Instructor, Code Ninjas, September 2019 - May 2022

- Served as a coding instructor and curriculum developer for an after-school program catering to children aged 7-14.

- Authored and implemented an 'AI with Python' course, later adopted as a camp program at various national locations.

◇3 Computer Proficiencies

Programming Languages: C, JavaScript, Python, C++, Julia
Programming Concepts: Algorithms, Data Structures, Elementary Machine Learning, NumPy, Matplotlib, Scipy, TensorFlow, Keras
Computer Programs: LaTeX, Excel, Adobe Premiere Pro, Ableton Live 10, Fusion 360, Notion

◇4 Certifications

CITI Good Clinical Practice Biomedical Course, CITI Medical Campus Biomedical Researchers, CITI Community-Engaged Research, CITI Conflicts of Interest.

◇5 Mathematical Coursework & Teaching

◇5.1 Present Coursework

2024 - 21-269: Vector Analysis, Carnegie Mellon University Functions of several variables, regions and domains, limits and continuity, sequential compactness, partial derivatives, linearization, jacobian, chain rule, inverse and implicit functions and geometric applications, higher derivatives, taylor's theorem, optimization, vector fields, multiple integrals and change of variables, Leibnitz's rule, line integrals, Green's theorem, path independence and connectedness, conservative vector fields, surfaces and orientability, surface integrals, divergence theorem and Stokes's theorem.

2024 - 21-127: Concepts of Mathematics, Carnegie Mellon University Symbolic logic, equivalence, variables and quantifiers, sets, set operations, functions, Peano's axioms, weak induction, strong induction, equivalence relations and partitions, finite sets, countability and uncountability, division, primes, modular arithmetic, counting principles, inequalities, sequences and series, convergence, cardinal arithmetic, discrete probability spaces, random variables.

◇5.2 Past Coursework

2023 - 21-241: Matricies and Linear Transformations, Carnegie Mellon University linear equations, row reduction, echelon forms, vector equations, matrix equation Ax = b, solution sets of linear systems, linear independence, linear transformations, matrix operations, matrix inverse, invertible matrices, matrix factorizations, determinants, vector spaces, subspaces, null spaces, column spaces, bases, coordinate systems, dimension of vector space, rank, change of basis, eigenvectors, eigenvalues, diagonalization, complex eigenvalues, discrete dynamical systems, inner product, length, orthogonality, orthogonal sets, orthogonal projections, Gram-Schmidt process, least-squares problems, diagonalization of symmetric matrices, quadratic forms, singular value decomposition. **Grade: A**

2023 - 21-122: Integration and Approximation, Carnegie Mellon University Advanced integration techniques, sequences and series, Taylor polynomials and Taylor series, radius and interval of convergence, differential equations, vectors in $\mathbb{R}^3$, dot and cross products. **Grade: A**

2022 - Math E-23a: Linear Algebra and Real Analysis I, Harvard University
Quantifiers, Sets, Functions, Fields, Matricies and Linear Transformations, Dot and Cross Products; Euclidean Geometry of $\mathbb{R}$, Row reduction, Independence, Basis, Eigenvector and Eigenvalues, Number Systems and Sequences, Series, Convergence, Power Series, Limits and Continuity of Functions, Derivatives, Inverse Functions, Taylor Series, Topology, Sequences and Series in $\mathbb{R}$, Differential Equations, Limits and Continuity in $\mathbb{R}$, Partial Derivatives, Differentiability, Newton's Method, Inverse Functions, Implicit Functions, Manifolds, Tangent Spaces, Critical Points, Lagrange Multipliers. **Grade: P**

2022 - Math E-16: Calculus II, Harvard University
Definate Integrals, Antiderivatives, and Direct Substition, Integration by Parts, Partial Fractions, Integration Tables, Numerical Approximations, Improper Integrals, Applied Calculus in Geometry, Densities, Economics, and Probability Theory, Differential Equations, Slope Fields, Euler's Method, Seperation of Variables, Applications of Differential Equations, Geometric Series and Convergence Tests, Taylor Polynomials and Taylor Series **Grade: P**

2022 - A3.5: Advanced Algebra 3.5, AwesomeMath Summer Program
Fields, Rings, Polynomial Roots, Polynomial Divisibility, Euclidean Algorithm, Lagrange Interpolation, Irreducibility, Euclid's Lemma, Primitive Polynomials, Gauss Lemma, Ostrowski's Criterion, Eisenstein's Criterion, Perron's Criterion, Schonemann s Criterion, Kronecker Algorithm, Multivariate Polynomials, Symmetric Polynomials, Newtonian Sums, Cauchy Formulas, Algebraic Numbers, Mahler Measure, Kronecker's Theorem, Cauchy-Schwarz Inequality, Aczel's Inequality, Titu's Lemma, Rearrangement Inequality, Chebyshev's Inequality, Bernoulli's Inequality, Holder's Inequality, Minkowski's Inequality, Jensen's Inequality, Nesbitt's Inequality, Karamata's Theorem, Muirhead's Inequality, Popoviciu's Inequality, Monotonicity, Convexity, Functional Equations, Cauchy Equation, Continuity, Bounds, Injectivity, Surjectivity, Bijectivity, Reccurent Sequences, Homogeneous and Nonhomogeneous Recurrences **Grade: P**

2022 - NT3: Advanced Number Theory 3, AwesomeMath Summer Program Bezout's Identity, Chinese Remainder Theorem, Wilson's Theorem, Fermat's Little Theorem, Euler's Theorem, Exponent of Prime, Legendre's Formula, Lifting the Exponent Lemma, Order Modulo p, Primitive Roots, Cyclotomic Polynomials, Prime Divisors of $\Phi_n(a)$, Weak Dirichlet Theorem, Zsigmondy's , Central Binomial Technique, Chebyshev's Estimates, Bertrand's Postulate, Mertens Estimates, Quadratic Reciprocity, Counting Points Modulo p, Points on Spheres, Gauss Sums, Groups, Rings, Fields, Integral Domains, Unique Factorization Domains, Residue Rings, Reduction Maps, Ideals, Thue's Lemma, Fermat's Christmas Theorem, Diophantine Equations, Zeta Functions, Chevalley-Warning and Erdos-Ginzburg-Ziv Theorems, p-adic Numbers, Hensel's Lemma, Skolem-Mahler-Lech Theorem **Grade: P**

2022 - CO2: Combinatorics 2, AwesomeMath Summer Program Basic Counting Techniques, Set Theory, Permutations, Combinations, Binomial Coefficients, Pascal's Triangle, Binomial Theorem, Vandermonde's Identity, Hockey-stick Identity, Stars and Bars, Principle of Inclusion Exclusion, Recursion, Bijections, Generating Functions, Probability, Expected Value, Random Walks, Graph Theory, Exponential Generating Functions, Automorphisms **Grade: P**

2021 - SDP: Abstract Algebra, Beaver Country Day School
Modular Arithmetic, Induction, Equivalence Relations, Functions, Symmetry, Groups, Dihedral Groups, Cayley Tables, Subgroups, Ring Homomorphisms, Cyclic Groups, Permutation Groups, Isomorphisms, Automorphisms, Cosets, Lagranges Theorem, External Direct Products, Normal Subgroups, Factor Groups, Burnside's Lemma **Grade: A**

2021 - SDP: Discrete Math and Proof Writing, Beaver Country Day School
Propositions and Connectives, Conditionals and Biconditionals, Quantifiers, Mathematical Proofs, Set Theory, Set Operations, Induction, Principles of Counting, Cartesian Products and Relation, Equivalence Relations, Bijections, Finite, Infinite, and Countable Sets **Grade: A**

◇5.3   Teaching

2019-Present - Private Math & Computer Science tutor
2023 - TA & Substitute, Number Theory 2, AwesomeMath Summer Program
2023 - TA, Algebra 2.5, AwesomeMath Summer Program
2023 - TA, Combinatorics 2, AwesomeMath Summer Program
2023 - Instructor, NuVu Thinking Problem Solving Seminar, NuVu Innovation School
2022-2023 - Co-instructor, Algorithmic Art, Renewable Design Space, Computing in the Community, Time to Relate, Health Sense, NuVu Innovation School
2020-2022 - Instructor, BVR HAX, Beaver Country Day School
2019-2022 - Instructor, Code Ninjas

References available upon request