AI Math Curriculum Roadmap

1. Linear Algebra

- Scalars, vectors, matrices, tensors

- Vector operations (dot, cross)

- Matrix operations (addition, multiplication, transpose)

- Matrix properties (identity, inverse, rank, orthogonal)

- Linear transformations, basis, span, projections

- Determinants and their meanings

- Eigenvalues and eigenvectors, diagonalization, PCA

- Singular Value Decomposition (SVD)

2. Calculus

- Limits and continuity

- Derivatives and partial derivatives

- Chain rule and backpropagation

- Multivariable functions, gradient vectors

- Optimization techniques (Gradient Descent, Adam)

- Optional: Integrals and area under curves

3. Probability & Statistics

- Random variables, conditional probability, Bayes' theorem

- Distributions: Bernoulli, Binomial, Poisson, Normal, Exponential

- Central Limit Theorem

- Mean, variance, standard deviation, covariance

- Bayesian thinking and inference

- Hypothesis testing, p-values, t-tests, confidence intervals

4. Discrete Math

- Logic: Propositional and predicate logic, proof techniques

- Set theory: unions, intersections, power sets

- Combinatorics: permutations, combinations, counting principles

- Graph theory: trees, DAGs, shortest paths, applications in AI

5. Numerical Methods

- Solving linear systems numerically

- Gradient approximation and differentiation

- Numerical optimization (Newton's method, SGD variants)

Suggested Weekly Plan

Week 1-2: Linear Algebra Basics

Week 3-4: Advanced Linear Algebra

Week 5: Calculus Refresher

Week 6: Multivariable Calculus

Week 7-8: Probability & Stats

Week 9: Hypothesis Testing

Week 10: Discrete Math & Logic

Week 11: Numerical Methods

Week 12+: Apply knowledge to ML projects