Final Assessment

*Please complete and submit **any ONE** of the following projects. You are only required to complete the actual problem. Only do the extension if you feel like pushing yourself; there are no extra points for completing the extension. The deadline for submission is May 3 by 11:59 PM.*

OPTION A: Implement a program that generates and visualizes a 2D Voronoi diagram from a set of input points, where each cell contains all points closer to its generator point than to any other generator. Your solution should efficiently compute the boundaries between cells, display the diagram visually with appropriate coloring, and to include functionality to identify which cell a query belongs to. *(Extension: Extend your implementation with at least one advanced feature such as weighted Voronoi diagrams, Fortune's algorithm, or an application to a real-world problem like facility location or crystallization dynamics.)*

OPTION B: Prove Radon's Theorem: Any set of $d + 2$ points in $\mathbb{R}^d$ can be partitioned into two disjoint subsets whose convex hulls have a non-empty intersection. *(Extension: Prove Tverberg's Theorem, which is a generalization of Radon's Theorem: Any set of $(r-1)(d+1)+1$ points in $\mathbb{R}^d$ can be partitioned into r disjoint subsets whose convex hulls have a non-empty intersection.)*

OPTION C: Complete a series of smaller proofs connecting the theory of affine spaces to an area of your interest. Please run your idea past me for approval before you start! (But I'll more than likely say yes.)