1 Proposal Summary

We plan to develop and test an online hyperguide that provides unifying perspective to a wide variety of techniques and applications encountered by students, for review, preview, context and motivation throughout their courses. What distinguishes our project is its explicit emphasis on recurring concepts and applications. It will consist of a network of interactive and dynamic excursions through the broad landscapes and important landmarks of the mathematics curriculum and its connections with exciting modern research and applications. These pages will be simultaneously linked through topic, history, or level of preparation, and supplemented with problems, hints, solutions, and suggestions for reading and research. We feel a resource devoted specifically to unifying principles and examples can be of great value to both students and teachers.

We encourage everyone to visit

http://www.math.utah.edu/~cherk/ccli/index.html

for a demonstration of selected examples described in the proposal. Among them are pages devoted to precalculus manifestations of calculus concepts, symmetries and the "number plane", equivalence relations everywhere, superposition in algebra, geometry, and calculus, patterns in the math curriculum, pitfalls of notation and vocabulary, optimality and optimization, the mathematics of materials, iteration and inversion in mathematics. Other areas we intend to develop include a treatment of the many forms of Stokes' theorem from geometrical, algebraic, and historical points of view, using helpful visualizations of the gradient, curl, and divergence; the matrix form of single-variable calculus formulas to make the relationship between single to multivariable calculus more apparent.