962-97-54   **Daniel L. McGee*** (`mcgee@cs.uprm.edu`), Department of Mathematics, University of Puerto Rico - Mayaguez, P.O. Box 9018, Mayaguez, PR 00681-9018, and **Rafael Martinez-Planell** (`r_martinez@rumac.upr.clu.edu`) and **Miguel Torres** (`mtorres@ece.uprm.edu`). *Visualization Tools for Three Dimensions.*

During a previous project at the UPRM, we discovered that our students lacked geometric visualization of three dimensional topics. We considered this an impediment to understanding multivariable calculus and undertook to improve our students visualization of 3-D concepts. With the help of the NSF (DUE-9952567) and students from Mechanical Engineering, we have designed a set of physical manipulatives that include the x, y, and z axes, points, vectors, curves, contours, planes, and surfaces that can be placed anywhere in a 3-D coordinate system. These are not two dimensional computer representations but actual 3-D representations. With these tools and their accompanying manual we have designed a program to provide geometric visualization of multivariable calculus concepts. In this presentation, we will present the tools we have developed for professors and a rudimentary version of the student kit to come. We will demonstrate how these tools may be used with the accompanying manual. And we will present the results of a preliminary study we have conducted to measure their effectiveness. (Received July 08, 2000)