1056-R1-488 **Robert P. Webber*** (webberrp@longwood.edu), Math and CS Department, Longwood University, 201 High Street, Farmville, VA 23909. *Illustrating Gradients.*

A standard Calculus III problem is: Given a function of two variables, find the direction and magnitude of the maximum change in the dependent variable at a given point.

The solution is to calculate the gradient of the function at the point. The gradient gives the direction, and its magnitude gives the maximum change.

It would be nice to illustrate the solution graphically. This would help give students an intuitive understanding that the gradient really does solve the problem. However, such graphs are infeasible without technology, except in the simplest of cases.

This paper will show, using Maple, how to graph several contour lines, draw the gradient vector at the point, and plot several other vectors from the point showing the rate of change in various directions. Students will observe the magnitudes of the vectors and see that the gradient is the longest.

Finally, a peculiarity of Maple that could produce a misleading graph will be noted. By default, Maple draws the width of a vector to be a function of its length. If we are interested in comparing lengths only, we need to set the widths to be the same. Otherwise, the graph will encourage us to compare in two dimensions instead of one! (Received September 09, 2009)