1046-X1-967 **Mark Howell*** (`mhowell@gonzaga.org`), Gonzaga College High School, 19 Eye St NW, Washington, DC 20001. *Introducing Series Using Error.*

What's so special about the tangent line? Any line that intersects a curve at a point can be used to approximate the curve.

Using a grapher to zoom in on error functions, the answer to this question becomes obvious. Moreover, the methodology invites analysis of higher degree polynomial approximations.

The technique involves defining a function, f(x), a tangent line at x=a, t(x), and some other line that intersects f at x=a, w(x). Graph the two error functions, te(x) = t(x) - f(x) and we(x) = w(x) - f(x) in a window centered at (a,0). Then zoom in, first with equal scaling horizontally and vertically. You should see the graph of we(x) flatten out. This observation suggests that the function exhibits behavior greater than degree one. By changing the zoom factors, you can discern exactly what degree describes the error's behavior.

The next step is to find a quadratic function with the same output,slope and second derivative as f at x = a. and another quadratic with the same output and slope but whose second derivative differs from f's. As before, define error functions involving these two quadratics, and repeat the zooming analysis. (Received September 13, 2008)