Alexander Swart

D) The Heaviside function is interesting because it is one of the simplest discontinuous step functions. As a result, it cannot be smoothly approximated by a polynomial approximation method, we see that here, despite increasing the number of points by about 40 percent, the visual increase in the quality of the approximation leaves much to be desired, and we see the beginnings of the Runge Effect. On the other hand, the Lagrange interpolant for the sin function is relatively well defined, since sin is a well-behaved, analytic function.

24) The error in the estimate of the derivative increases rapidly with small values of h, since (1+epsilon) cubed rapidly approaches the machine error as h decreases. If there was a similar method (hint: there are) that doesn't require one to take the cube of one plus a small number, then you would not see this behavior. In order to have stable numerical methods, it is often helpful to attempt to minimise nonlinear mathematical calculations between numbers of drastically different magnitudes.