PHYS 331 Honors Computational Project

1. Electric Field of a Charged Sphere with a small hole on the surface.
   a) Consider a spherical shell of radius R centered on the origin of coordinates. The sphere is uniformly charged, with total charge Q, except for the region where $\theta \leq 1.00^{\circ}$. Consider field point on the positive z-axis. Determine $\vec{E}$ as a function of z.
   b) Write a computer program to do the integral. Evaluate the electric field at points $z = 0.01nR$, where n is an integer. Do this from $n = 0$ to $n = 500$. Provide a printout of your code.
   c) On the same graph, graph the *function* you obtained in part a) and the points you obtained in part b). Do not connect the points with a curve. Do both calculations give the same answer? If the graph is too messy, you may want to subdivide it into several graphs, or you may want to try just plotting a fraction of the points you calculated.
   d) Comment on your calculation.