Ay190 – Worksheet 12
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1 Solving the Poisson Equation

1.1 Part I and II

The density profile given by the data and the interpolated density profile are shown in Figure 1. I took the 3rd column as radius and the fourth as density, based on order of magnitude and whether it was positive/negative, increasing/decreasing.

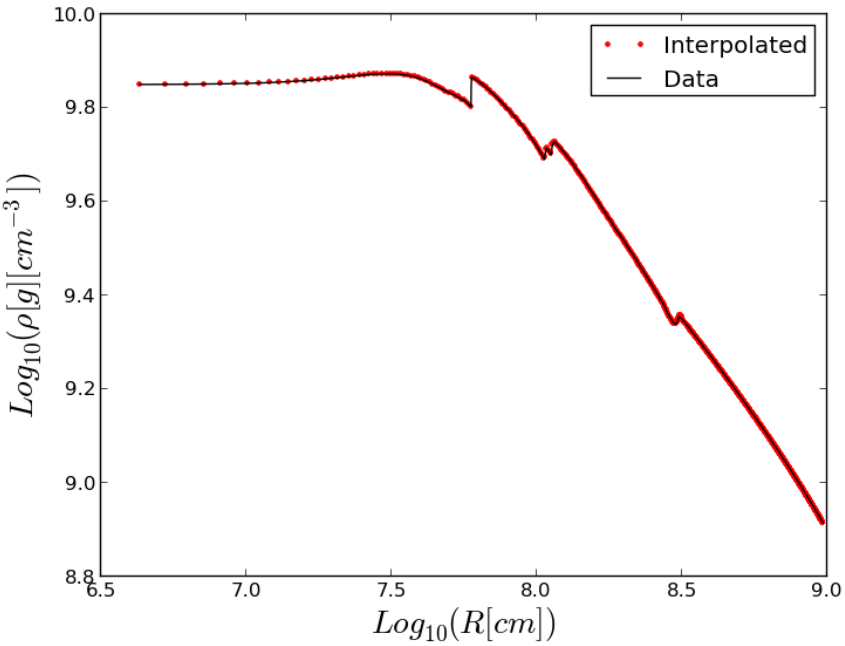

Figure 1: Interpolated function of density plotted with given data.

1.2 Part III

To do this, I split the Poisson equation into two first order ODE's.

$\frac{d\phi}{dr} = u$
$\frac{du}{dr} = -4\pi G\rho(r)$

I implemented the forward Euler integration but I'm not sure if it worked out properly. Also didn't get the whole error analysis finished, but Figure 2 shows the result.

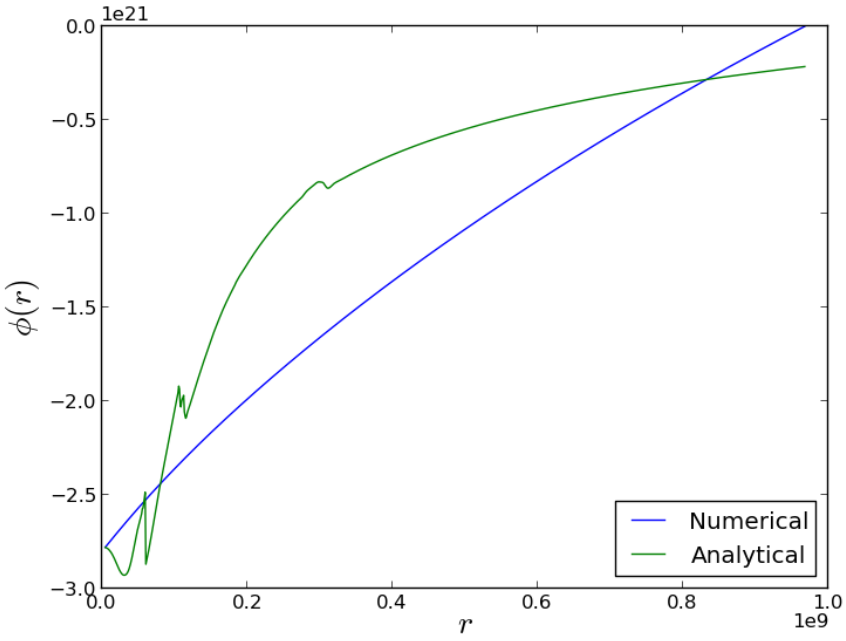

Figure 2: Analytically and numerically calculated potential functions.