Lam Comp Class HW4

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October 2020

1 Problem 1

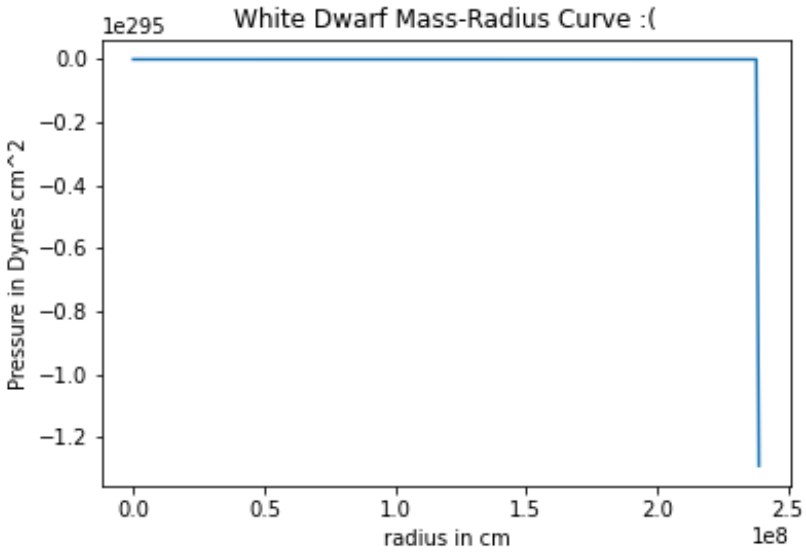

Figure 1: In this problem we are graphing a white dwarf in a mass-radius curve. We are doing this make making a function and use the static equilibrium equations that are not for relativistic speeds. What we should see is that towards the center of the white dwarf we are supposed to see the greatest amount of pressure towards the center of the star. We see this because of the gravity force trying to make the star collapse. We use our ODE solver to solve for the static equations. We will be using the earth radius with this as well. The issue here was the 10^{295}, I believe the pressure should be big but this is way off. I was hoping to get around $10^{35} - 10^{40}$.This is the reason why we see lines and not a curve. There can also be issues happening when I call my ODE solver or in my for loop. I could not get it to work but I tried my best. I do understand what is happening conceptually

2 Problem 2

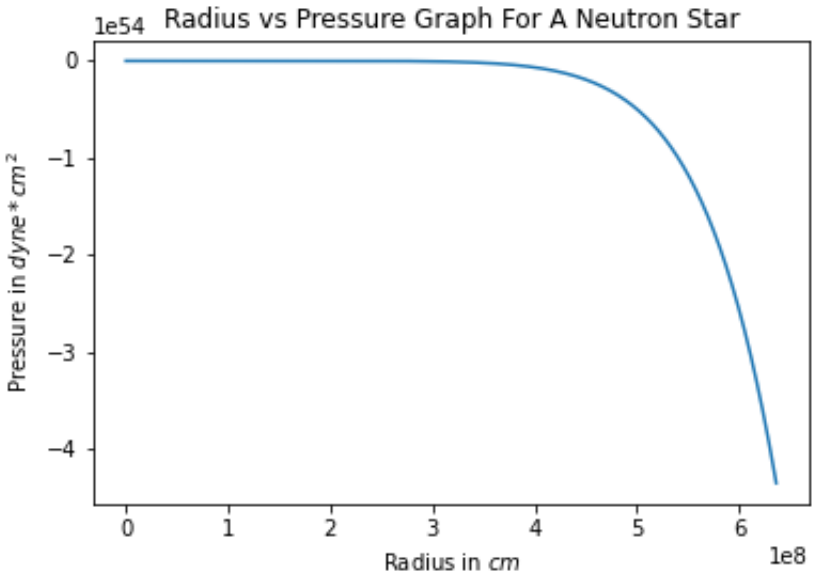

Figure 2: In this problem we are testing the a neutron star. With this one we did the same process as the W/D but had to use one of the static equation that includes relativistic speeds, different central density and a smaller radius. I played the numbers and could not get them to work with the updated restraints but oddly it worked with the white dwarf density and radius. Here we see the pressure dropping off with with radius. This is what we expect to see. Again having the greater pressure towards the center.

3 Problem 3

Here for this problem we are seeing if the TOV equation matches up to the numbers we see from the NICER survey. Given the radius and mass we plug those in with seeing the numbers and comparing it to the graph. In this case I got a number 1.7 solar masses compared to the surveys number of 1.44 solar masses. This saying that the TOV equation is rough estimate but still pretty close base on errors.