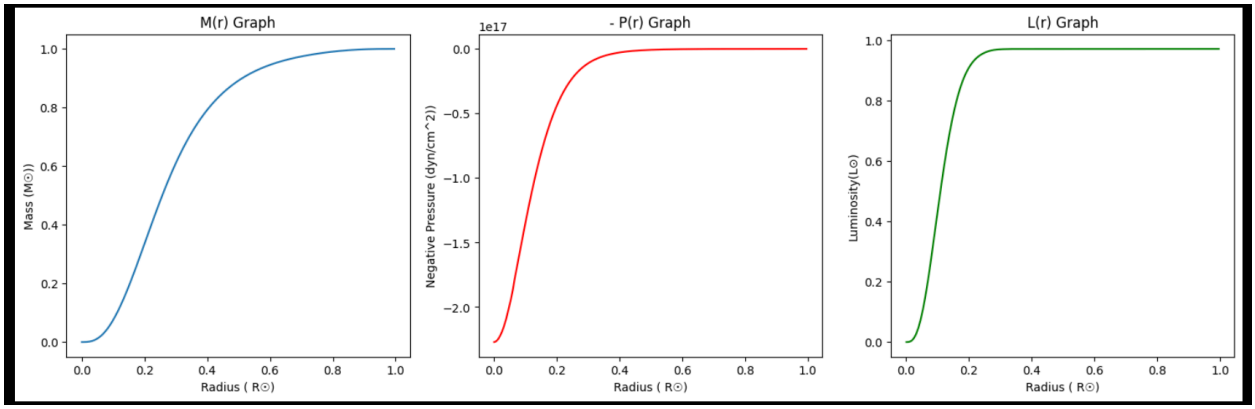
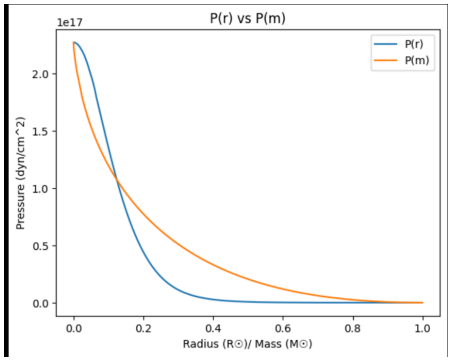
1. **Plot m(r) and label your axes properly (including units!). Are there other variables with qualitatively similar behavior that one could use as independent coordinates for the stellar structure? Try to make other plots to find some, and explain the mathematical property that allows you to use m(r) and any other variable you saw as a coordinate.**



As you can see here, there are 2 more variables I found that have relatively similar behavior as m(r), that is - P(r) and L(r) (pressure and luminosity in terms of radius). Pressure has the opposite values when it gets larger at a smaller radius and smaller at a larger radius (which makes complete sense since the pressure in the center of the star should be way larger). While luminosity and mass increase as the radius increases. Overall, the graph has similar exponential increases at the beginning and capped at the value of 1 solar mass/ dyn/cm^2 /solar luminosity, which is expected. The mathematical property that I think links these 3 together is dependent on the radius, where the value increases/decreases the same way as the radius changes. This link to radius can also help to link these 3 values together, effectively using them as a coordinate.

2. **With the model above, check the central pressure of the star (you can also plot P(m) and P(r), or look at the final frame in the movie made by MESA-web for you) and compare it with the estimate above and the one provided in Onno Pols' lecture notes.**



Despite being a bit different in terms of magnitude, the pressure-decreasing trend is pretty much similar in both plots, solidifying the relationship between pressure and mass in the star through the radius. Mass is proportional to radius while radius is inversely proportional to pressure. Therefore mass is also inversely proportional to the pressure in a relatively similar scale. This behavior is well predicted and I think we can use mass and radius interchangeably in this situation. They also behave very similarly from 0.8 solar mass/radius and beyond. I skimmed through the lecture note from Dr. Pol and the equations from chapter 3 agree with my statement.

3. **Check also the outer luminosity: is it the value you expected?**

   Yes, it is the value I expected. The luminosity of the star increases as the radius increases since the area encompassed by the radius is larger, hence more energy/flux, thus more luminosity. It also increases very consistently with mass and pressure but then again, luminosity is proportional to R^2 which is also proportional to mass so that makes perfect sense.