Write a code to compute the passive evolution of a stellar population whose star formation shuts off at time *t=0*. For the sake of simplicity, you can assume that all stars are on the Main Sequence (i.e., when they die, they effectively disappear rather than become giants).

Assume that at time *t=0*, the stellar population has a Salpeter mass function and contains stars of all masses in the range $0.08 - 50 M_{sun}$

1) Calculate the total luminosity of the stellar population as a function of time in units of its starting luminosity L_0 . Then convert this to absolute magnitude: *M(t)-M(0)*, the difference between the absolute magnitude at time t and that at time *t=0*.

Plot *M(t)-M(0)* as a function of time (make the x-axis run from 0 to 10Gyr).

2) Calculate the *g-r* color of the stellar population as a function of time. Use the following approximation for the color of a Main Sequence star as a function of its mass: $g - r = \ln\left(\frac{M+2}{M}\right) - 0.65$, where M is in units of M_{sun}. *(Warning: this approximation is crude so don't use it in your research!)* Note that this expression gives you the color of a single star of mass *M*, not a whole stellar population containing a range of masses.

Plot *g-r* for the stellar population as a function of time (make the x-axis run from 0 to 10Gyr).

3) Use your results from steps (1) and (2) to show how a stellar population evolves on a color-magnitude plot. Specifically, make a plot where the x-axis is *g-r* and the y-axis is *M(t)-M(0),* and show the location of a stellar population at the following ages: 10Myr, 100Myr, 1Gyr, 2Gyr, 5Gyr, 10Gyr. Label your points so it's clear which point corresponds to what age.

Clearly show all your steps in a write-up, including the equations you used. Please don't make me try to see what equations you used by looking at your code! Also attach a printout of your code.