

AST 250 – Spring 2019

Homework Due: Monday Feb. 25

19. The main sequence lifetime of a star may be estimated assuming a constant luminosity over its main sequence lifetime and that the only source of energy is fusion. Using the empirical relationship between mass and luminosity of main sequence stars, derive the scaling relationship between main sequence lifetime and mass of the star (Hint: how does main sequence lifetime, t_{life} , depend on mass ... $t_{\text{life}} \sim M^p$? You will need to figure out p .) To write your final answer that allows you to calculate t_{life} for any star, assume the Sun's main sequence lifetime is 10^{10} yrs and that 10% of its total mass goes through p-p chain burning.

