AST 250 – Fall 2017
Homework Due: Wednesday September 13

10. The first exoplanet to be discovered around a main sequence star was a half-Jupiter mass planet orbiting very close to the star 51 Pegasi (m_V = +5.49 mag, D = 15.61 pc).

(a) What is the absolute visual magnitude of 51 Peg?

(b) How does the luminosity of 51 Peg compare to the Sun (quote as ratio to L_{sun})? Use information you derived from part (a) to calculate the luminosity.

(c) The effective temperature of 51 Peg is T = 5570 K. How big is 51 Peg compare to the Sun (quote as a ratio to R_{sun})?

(d) If the planet 51 Peg b orbits at a radius of 0.053 AU on a 4.23 day orbit, how many times larger is the incident flux on the planet's atmosphere than the solar flux at the Earth? (T = 5780 K for the Sun).

(e) The estimated temperature of the planet 51 Peg b is 1200 K. This type of planet is called a hot Jupiter. Calculate the wavelength at which 51 Peg b emits the maximum flux assuming it emits as a blackbody. Give your answer in units of μm to one decimal place.