

Extraterrestrial Life: Homework #5

Due, in class, Thursday April 10th

- 1) Briefly explain the radial velocity (or Doppler) method for detecting extrasolar planets. Why does this technique work best for finding massive planets, and those in short period orbits around their host stars?
- 2) What is meant by the term "hot Jupiters"? Why is the existence of these planets surprising in the context of the theory of planet formation that was developed to explain the properties of the Solar System?
- 3) The planet Saturn has a mass of 5.7×10^{26} kg and orbits the Sun at a distance of 1.4×10^{12} m. If Saturn were the *only* planet in the Solar System, calculate the velocity with which the Sun would move around the center of mass of the Sun + Saturn system.
- 4) An extrasolar planet orbits a Solar mass star in a circular orbit at a distance of 0.05 AU. Calculate the orbital velocity of the planet and the orbital period of the planet.
- 5) The same extrasolar planet (orbiting at 0.05 AU) has a radius of 9×10^7 m. If the atmosphere of the planet reflects 50% of the star's light, calculate the fraction of the stellar luminosity that is intercepted and reflected by the planet.