AST 250 – Spring 2019
Homework Due: Friday April 5

30.   Use the radial velocity curve observed for a planet around 47
Ursae Majoris (1.48 L_{sun} , 1.08 M_{sun}). Assume circular orbits.
(a) Draw diagrams (looking down perpendicular to this solar
system) showing the positions of the planet and the star relative
to the center of mass when the velocity of the star is measured to
be +50 m/s, 0 m/s, and -50 m/s (NOTE: define negative velocity
as coming towards the observer). Indicate direction to observer.
(b) Assuming the period of the orbit from the curve below is 2.95
years, calculate the planet's semi-major axis (in AU).
(c) Estimate the minimum mass of the planet (quote as a ratio to
the mass of Jupiter) and determine what type of planet it is likely
to be (terrestrial, super-earth, ice giant, gas giant). Hint: how is
the momentum of the star related to the momentum of the planet?
(d) What "solar flux" does this planet receive (quote as ratio to
flux Earth receives from the Sun)? If this planet had an Earth-like
moon, would you expect liquid water to be on its surface?