ASTR702 - HW9. Last one!
December 2, 2024, Due December 6, 2024
2 pt each part

1) What is the velocity shift of the Sun due to Jupiter?

2) By what fraction does the Sun's flux decrease during Mercury's transit? Mercury orbits at 0.4AU and has a radius of 2.44×10^6 m. Use solid angles!

3) Assume you identify a star that is oscillating in position every 50 years due to a transiting (but unseen) companion.

a) If you measure a parallax of $0.4''$, what is the distance to this system?

b) The angular extent of the semimajor axis of the reduced mass is $7.6''$. What is the sum of the masses? Assume that the inclination is 0. Hint: convert angular extent to radians.

c) Now assume you measure the radial velocity of the star in question and find that it is nonzero. What does this imply about your answer in part b)?

d) Assume you measure an apparent visual magnitude for the system of -1 and that you believe the secondary star to be a white dwarf. Solve for the luminosity, then the mass of the primary using the mass-luminosity relationship. The Sun's absolute visual magnitude is +4.8. What is the upper limit to the value of the mass function?