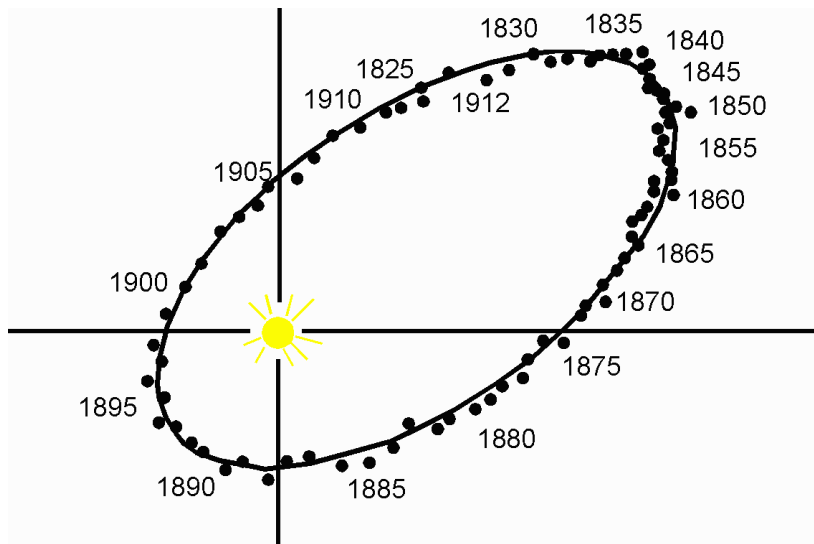


Introduction to Astronomy

HW140303

due in one week

1. How far away is a star that has a proper motion of 0.08 arcseconds per year and a tangential velocity (proper motion) of 40 km/s? For a star at this distance, what would its tangential velocity have to be in order for it to exhibit the same proper motion as Barnard's star?
2. The visual binary 70 Ophiuchi has a period of 87.7 years. The parallax of 70 Ophiuchi is 0.2 arcseconds, and the apparent length of the semimajor axis as seen through a telescope is 4.5 arcsec. (a) What is the distance to 70 Ophiuchi in parsecs? (b) What is the actual length of the semimajor axis in AU? (c) What is the sum of the masses of the two stars in solar masses? Also see figure in p. 467 of your textbook.



3. Search the World Wide Web for information about *Gaia*, a European Space Agency (ESA) spacecraft meant to extend the work carried out by *Hipparcos*. What is the status of *Gaia*? What is the main mission of *Gaia*? How does it compare to *Hipparcos* in terms of performance? What other types of research will it carry out?
4. A star is measured to have $m_V=10.00$. It is later resolved to be a binary with a brightness ratio of 2. What is the apparent magnitude of each binary component? If the system is at a distance of 100 pc. What is the absolute magnitude of each star?