

Please type up or print out your homework and staple the pages together. Leave a blank space to write in mathematical equations or diagrams. Make sure you **show your work** for any calculations – “magical” answers will receive no credit. Problems are **due at the beginning of the lecture**.

Review questions, Problems, etc. which have a chapter and number noted are from your text *Stars and Galaxies, 6th edition*.

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1. For which stars does absolute visual magnitude differ least from absolute bolometric magnitude? Why? (Chapt. 9, Review Question 5)
2. The parallax of the bright star Sirius is 0.375 seconds of arc. By how much, during the year, does the position of Sirius shift relative to distant background stars? If an astronomer were observing from the surface of Mars, by how much would Sirius shift during the Martian year?
3. A binary star system contains one star of mass  $0.8 M_{\odot}$  and another of mass  $2.2 M_{\odot}$ . They are in circular orbits and the distance between the centers of the stars is 1.5 AU.
  - (a) What is the period  $P$  of the binary?
  - (b) Find the location of the center of mass (i.e., how far is it from the center of the more massive star?).
  - (c) Compare the gravitational force of the two stars on a small mass  $m$  located at the center of mass. Are the forces equal?
4. A double-lined spectroscopic binary has a period of 30 days and the velocities of the two stars are 70 km/s and 200 km/s.
  - (a) What is the ratio of the masses of the stars?
  - (b) Assume we are in the plane of the orbit. What is the total separation of the stars? What is the total mass and the individual masses of the stars?
  - (c) If instead, the orbit is inclined at an angle of 45 degrees, what are the true velocities of the stars? In this case, what is their separation? What is the total mass and the individual masses?
5. Problem 14, chapter 9 of the text.