ASTRONOMY 211 S. Balbus
Problem Set#7 Assigned: 29 November 2004 Due: 6 December 2004

1. The distance modulus is defined to be the difference between the apparent magnitude m and the absolute magnitude M. What is the distance modulus of the Andromeda galaxy, 750 kpc away? What would be the apparent magnitude of a 1 $M_\odot$ in Andromeda?

2. Two stars are unresolved. They have magnitudes m_A and m_B, respectively. What is the magnitude m of both stars seen together? (No, it is not $m_A + m_B$.)

3. Look at figure 9.7. Assume that each tick mark on the ordinate corresponds to five magnitudes, and that the distance to NGC 2362 is 1000 pc. What is the distance to the Praesepe cluster?

4. Shu, problem 10.1 There is a mistake in his expression for r. Notice that this is a long problem. Leave time!

5. Two standard NSs are in a circular orbit with an 8 hour period. Each has a mass of 1.4 $M_\odot$.

5a. What is their separation?

5b. The rate of gravitational radiation energy produced by the orbit is

$$\frac{dE}{dt} = \frac{32}{5}\frac{G^4}{a^5 c^5} M_1^2 M_2^2 (M_1 + M_2)$$

Where a is the separation, M_1 and M_2 are the masses, and everything else has its usual meaning. Evaluate dE/dt and estimate about how long it will take for the orbit to decay by this energy loss mechanism.