AST 308, Homework Set 4

Due Tuesday, Oct. 18 at start of class.

But try to do each problem as we come to it in class.

1. The Andromeda Galaxy M31 is approaching the Milky Way with a radial velocity of -119 km s^{-1} (relative to the center of our Galaxy). Suppose that this radial velocity represents the entire "peculiar" velocity (the velocity *not* due to the Hubble flow) of M31. How far away would a galaxy having the same peculiar velocity as M31 need to be so that if we used *only* that one galaxy to determine the Hubble constant, the error due to its peculiar velocity would cause an error of 3% in the derived value of H_o? Use the value of H_o found by the HST key project. According to one of my slides, "being in the Hubble Flow" means having a redshift $z \geq 0.01$. Would a galaxy at that distance you found in this problem be in the "Hubble flow"? Why is it important to use objects that are "in the Hubble Flow" to measure cosmological parameters?

2. Do the following CO problems:

   29.7 Max size and lifetime of a closed universe.
   Hint: An approach for doing part (b) is to use the parametric solutions to the Friedmann eqn, found on [CO pg. 1156].
   29.9 Show that all universes are flat at small *t*.
   29.12 Derive the acceleration equation.
   Hint: you will need to use eqns: [29.10] and [29.50].

I will (try to) remind you of each of the above CO problems as we reach the related material in the lectures. I recommend that you actually do each problem at the time we come to it in class. You could do Problem 1 right away.