

Astronomy 45
Introduction to Astrophysics
Fall 2002

Problem Set 10 - Due Friday December 6, 2002

- 1 Two galaxies were separated by a distance d at a time corresponding to a red shift $z = 2$. What is their separation today?
2. Assume that the Hubble constant is $70 \text{ km s}^{-1} \text{ Mpc}^{-1}$. Using the Hubble law, calculate the distance of a galaxy at a red shift of 1%.
3. The lookback time is the travel time required for light at a red shift z to reach us. Show that for a flat Einstein-De Sitter model it is given by

$$t_{lb} = \frac{2}{3H_0} \left(1 - \frac{1}{(1+z)^{3/2}} \right).$$

What is the lookback time for a quasar at $z = 4$ if one Hubble time is 14 billion years?