

Cosmo-101, 2005
Problem Set 3

3. Consider a critically-bound matter-dominated universe.

a) Show that the age t is related to density by:

$$t = \frac{1}{\sqrt{6\pi G\rho}}.$$

Start with the equation $\ddot{r} = -(4/3)\pi G\rho r$.

b) Show that the Hubble constant H depends on redshift as:

$$H = H_0(1 + z)^{-3/2}.$$

c) Compute the angular diameter distance D_A as a function of redshift.