

PHYS 480/581
Cosmology

Worksheet #8
Monday 09/19/2022

Question 1.

Derive some simple expressions for the conformal time η as a function of a .

- (a) Show that $\eta \propto a^{1/2}$ in a matter dominated universe, and $\eta \propto a$ in a radiation dominated universe.
- (b) Consider a universe with only matter and radiation. Show that

$$\eta = \frac{2}{\sqrt{\Omega_m H_0^2}} [\sqrt{a + a_{\text{eq}}} - \sqrt{a_{\text{eq}}}], \quad (1)$$

where a_{eq} is the scale factor when the energy density of matter equals that of radiation.

