ASTR 425/525
Cosmology

Worksheet #3

Monday 08/25/2025

Question 1.

Assuming $a(t) = (t/t_0)^{2/3}$, where $t_0 = 13.8$ Gyrs is the age of the Universe, compute the comoving distance in Gpc travelled by a photon since the Big Bang ($t = 0$). Photons always travel on null paths ($ds^2 = 0$). How does this compare to the size of the visible Universe? Remember that 1 pc $= 3.086 \times 10^{16}$ m and $c = 2.99 \times 10^8$ m/s.

Question 2.

If two objects have a physical separation of 150 Mpc today (t_0), what was their separation when the Universe was $380,000$ years old? Assume that $a(t) = (t/t_0)^{2/3}$.