

**PHYS 480/581**  
**Cosmology**

Worksheet #3  
Monday 08/29/2022

**Question 1.**

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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 ( $ds^2 = 0$ ).



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**Question 2.**

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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  $a(t) = (t/t_0)^{2/3}$ .