

# Homework 3, due 9/28/04

5. Show that in a Friedmann universe the luminosity distance  $d_L$  is related to the redshift  $z$  by:

$$d_L = \frac{c}{H_0} \frac{zq_0 + (q_0 - 1)(\sqrt{1 + 2q_0z} - 1)}{q_0^2} .$$

6. Show that, in the limit of small  $z$ :

$$d_L = \frac{c}{H_0} \left( z + \frac{1}{2}(1 - q_0)z^2 \right) .$$

7. Show that the small  $z$  limit of Ex. 6 is independent of the Friedmann equation and is therefore true for any cosmology.