

**Physics 3002**  
**Problem Set 3, due 2/18/09**  
**Lam Hui**

Solve the Friedmann equation for  $a(t)$  for a flat universe ( $k = 0$ , or  $\kappa = 0$  in Ryden's notation) which is filled with some form of stuff with an equation of state  $P = -2\varepsilon/3$ . You can use the initial condition that  $a = 0$  when  $t = 0$ . Further, for such a universe, express the age of the universe today  $t_0$  in terms of the Hubble constant  $H_0$ .