

## 442 Tutorial Sheet 7<sup>1</sup>

8 March 2005

1. (3) Find the Robinson-Walker solution with positive cosmological constant and no matter for all three values of  $k$ .
2. (2) The *particle horizon* is the radius of the sphere of all particles that could be seen by us. It is the maximum straight line distance that could have been travelled by a light ray since the beginning of the universe. Obviously, in a static universe this would be  $t_0$ . What is it for a  $k = 0$  dust universe?
3. (2) What is the particle horizon for an inflating universe.
4. (1) Find an integral formula for the age of the universe with general  $k$  and  $\Lambda \neq 0$ . This integral is elliptic and can be integrated explicitly in terms of elliptic functions. This is not required here.
5. (3) Calculate the leading order correction to the age of a dust universe with  $\Omega_0 = 1 + \epsilon$  and  $\epsilon > 0$ . We previously looked at  $\Omega_0 = 1 - \epsilon$ .

---

<sup>1</sup>Conor Houghton, [houghton@maths.tcd.ie](mailto:houghton@maths.tcd.ie), see also <http://www.maths.tcd.ie/~houghton/442.html>