AST322 Chapter 3 Homework (Due 2/8/18)

NOTE: These questions are intended for Ryden's Cosmology, 2nd Edition

3a: Prove Ryden equations (3.20) and (3.21) from (3.19)

3b: In the caption for Ryden Figure 3.3, it states that the deflection of a light beam traveling across a box 2 meters wide subjected to an acceleration of g=9.8m/s/s will be about $2*10^{-14}$ m.

Is Ryden correct about this? Do the calculation for yourself.

Suppose you wanted to measure the deflection of such a beam to verify whether or not this deflection actually occurs. To do this, you have a long, perfectly flat room, with a beam emitter aligned perfectly parallel to the ground at one end, and a detector wall at the other end. If you were able to measure the deflection of this beam (relative to a perfectly straight line) with a precision of 10nm, how far away would your detector wall have to be from your emitter?

3c: Show that Ryden equation (3.36) can be derived from (3.33), (3.34), and the assumption that $x = S_\kappa(r)$