8.286 Lecture 7
September 28, 2016

THE DYNAMICS
OF
NEWTONIAN COSMOLOGY,
PART 2
Announcements

★ The class contact list is up and running. Want changes? Want to join? Send me email.

★ Problem Sets 1 and 2 are graded, and solutions are on the web.

★ Problem Set 3 is due Friday, 4:00 pm.

★ Quiz 1 is Wed Oct 5, one week from today.

★ Review Problems for Quiz 1, with solutions, are posted on the website. It also includes a formula sheet, which you will be given at the quiz. There are 22 problems, 8 of which are highlighted by stars. The 1up version is hyperlinked.
The coverage of the quiz is listed on the website and on the Review Problems: Lecture Notes 1-3, Problem Sets 1-3, Weinberg chapters 1-3, Ryden chapters 1, 2, and section 3.1.

One problem on the quiz will be taken verbatim, or almost verbatim, from either the homework assignments or from the starred Review Problems. For the homework, extra credit problems are eligible to be the problem used on the quiz.

Old exams are on the web, going back to 1994. Follow the link “8.286 Web Page Information from Previous Years”. 
★ Review session by Victor.

Decision Sunday, October 2, 6:30 - 8:30 pm.

★ Office hours:

Me: Today at 4 pm, 6-322. Monday at 4 pm?

Decision: Today at 4 pm, Monday 4-6 pm, 6-322.

Victor: Tomorrow at 5 pm, 8-308. Tuesday at 5 pm?

Decision: Tomorrow (Thurs) at 5 pm, 8-308; Tues (Oct 4) at 5 pm.
Mathematical Model

\[ t_i \equiv \text{time of initial picture} \]
\[ R_{\text{max},i} \equiv \text{initial maximum radius} \]
\[ \rho_i \equiv \text{initial mass density} \]
\[ \vec{v}_i = H_i \vec{r} \]
Shell Crossings?

Can shells cross? I.e., can two shells that start at different $r_i$ ever cross each other?

The answer is no, but we don’t know that when we start.

But we do know that Hubble’s law implies that any two shells are initially moving apart. Therefore there must be at least some interval before any shell crossings can happen.

We will write equations that are valid assuming no shell crossings. These equations will be valid until any possible shell crossing. If there was a shell crossing, these equations would have to show two shells becoming arbitrarily close.

We will find, however, that the equations imply uniform expansion, so no shell crossings ever happen in this system.