

# Physics 130 General Relativity Seminar

## Assignment 10 March 31, 2011

### Part 1: Readings

**Cheng:** Chapter 9 - Pages 181-204(The Homogeneous and Isotropic Universe)

**Amanda Peet GR Lectures** - Appropriate pages.

**Other sources** among references on website or books in my office.

### Part 2: Review Questions from Text

1. Cheng: 9-1, 9-2, 9-3, 9-7, 9-9, 9-10, 9-11, 9-12

### Part 3: Everyone Problems

1. Cheng: 9-2 Luminosity distance to the nearest star
2. Cheng: 9-3 Gravitational frequency shift contribution to the Hubble redshift
3. Cheng: 9-4 Energy content due to starlight
4. Cheng: 9-5 Night sky as bright as day
5. Cheng: 9-6 The virial theorem

### Part 4: Extra Problems

1. Cheng: 9-7 Proper distance from comoving coordinate  $\chi$  \_\_\_\_\_
2. Cheng: 9-8 Wavelength in an expanding universe \_\_\_\_\_
3. Cheng: 9-10 The steady-state universe \_\_\_\_\_
4. Cheng: 9-11  $z^2$  correction to the Hubble relation \_\_\_\_\_
5. EP #44 - Star with Constant Density \_\_\_\_\_
6. EP #61 - Robertson-Walker = Minkowski \_\_\_\_\_
7. EP #65 - Matter-Dominated RW Universe \_\_\_\_\_
8. EP #70 -  $k = 1$  Robertson-Walker Spacetime \_\_\_\_\_
9. EP #71 - General Robertson-Walker Spacetime \_\_\_\_\_