PHYSICS 631: General Relativity

Homework # 1
Due April 13, 2017

Please show all of your work, and in particular, pay attention to the form of the answer that I’m looking for. By all means, if you have any questions, please come see me.

1. Geometrized Units. Please express each of the following quantities in two ways: i) in \( m^n \), as meters raised to some appropriate power, and ii) in \( kg^n \) as kilograms raised to the appropriate power. E.g. \( 2.94 m^{-3} \) might be an answer.

   (a) The momentum of an electron moving at 0.8c (Recall that \( p = mv\gamma \))
   (b) The age of the universe (13.8Gy)
   (c) The orbital speed of the earth.

2. Schutz 1.3 (parts a-f)

3. Schutz 2.1. Also, as part (h) please compute \( B^\alpha \) as a column vector.

4. Schutz 2.14

5. Schutz 2.22

6. Schutz 2.30 (part b only)

7. Read and discuss problem 1.17, but do not write it up for submission.