Physics 556/714 Problem Set #3

due *beginning of class* Thursday Oct 2

1. Griffiths problem 3.4: "Cosmic ray muons are produced high in the atmosphere..."
2. What is the speed (expressed as a fraction of the speed of light) of a particle whose kinetic energy is equal to its rest energy?

3. **No calculators allowed:**
   What is the difference in speed of a 20 GeV (total energy) electron and a 50 GeV electron, expressed in units of cm/s? (Your calculator is not likely to keep enough significant digits to solve this problem directly. Even if it does, I want you to do the problem by hand.)

4. Griffiths problem 3.13: "A pion traveling at speed v decays..."
   Note that β and γ in the solution refer to the pion.

5. Griffiths problem 3.18: "A pion at rest decays into a muon and a neutrino..."
   Clues to part (a): What is the velocity of the muon? What is the average lifetime of the muon in terms of the mean proper lifetime τ? How are these quantities related to the momenta in the problem?

6. Griffiths problem 3.19: "Particle A, at rest, decays into three or more particles..."

7. Griffiths problem 3.24: "(Compton scattering.)"