Homework # 3; due Thursday, Sept. 23

Reading: Chapters 3,4 of Griffiths, Wikipedia.

11. Griffiths, Problems 3.3, 3.4, 3.6, 3.21, 3.27

12. Using the simplest case of one spatial and one time dimension, show that Lorentz transformations are equivalent to *hyperbolic rotations*. What is the difference between a "normal" rotation of the *xt* frame and the hyperbolic rotation?

13. What are the particles that collide at LHC? What is the collision energy in the center of mass? Suppose that one were to build a fixed-target experiment to produce the same center-of-mass energy. What should the energy of the moving particle be? Is this possible? In addition to the numerical results, please derive a formula that relates the center-of mass energy with the energy of the moving particle in a fixed target experiment assuming that the stationary and the moving particles have the same rest mass.