Homework 6

Due 9/15/11

1. In Tuesday’s class (9/13) we defined a new quantity \( u_0 = \frac{dt}{d\tau} \).

   (a) Show that under a Lorentz transformation, it transforms like the zeroth component of a 4-vector.
   i. e. show that
   \[
   u_0' = \gamma (u_0 - \frac{u_x v}{c^2})
   \]

   (b) Argue that
   \[
   u_0 = \frac{1}{\sqrt{1 - U^2/c^2}}
   \]

   where \( U \) is the speed of the particle in question.

   (c) What is the difference between the right hand side of Eq. (2) and \( \gamma \) that appears in Eq. (1)?

2. 2.59 of text. You will need to read section 2.11 before you attempt this.