HW #3

Problems 18, 23, 24 of Ohanian, Chapter 2.

Also do the following two problems:

1. Using the formulas for (Lorentz) transformation of velocity show that the relativistic definitions of energy and 3-momentum,

$$E = \frac{mc^2}{\sqrt{1-\vec{u}^2/c^2}}$$

$$\vec{p} = \frac{\vec{u}}{\sqrt{1-\vec{u}^2/c^2}}$$

indeed transform as the components of a 4-vector.

2. A particle collides elastically with a stationary particle of the same mass. Show that the angle between the trajectories of the outgoing particles is smaller than $\frac{\pi}{2}$, approaching this value in the limit of nonrelativistic velocities.