1. Recall the collision we set up class while discussing momentum. Let us now analyze the momentum using the relativistic momentum formula.

(a) What are the total relativistic momentum components $p_x$ and $p_y$ before and after the collision in frame S? Is momentum conserved in S?

(b) What is $v'_x$ for the Lorentz transformed velocity of the moving particle in S' before the collision? What is the total initial momentum $p'_x$ before the collision in S'?

(c) What is $v'_y$ for the Lorentz transformed y-component of the velocity of either particle after the collision? Use this to find the total speed of either particle $v'$ after the collision.

(d) Show that momentum is conserved in the collision in frame S'. Note: When you compute the relativistic momentum components in S' after the collision, the factor $\gamma$ has $v'$ in it, which comes from part (c).

2. Given $p = \gamma mu$ and $E = \gamma mc^2$, show that $E^2 = (pc)^2 + (mc^2)^2$. 