your name(s)_____

Physics 841 Quiz #1 - Monday, Jan. 23

Work in groups of four or fewer. This is open-note, open-book, open-internet, and open-mind. Turn in one worksheet per group, with all names included.

1. You are monitoring an asteroid, labeled a, and your buddy in a spaceship, labeled b. Both are in deep space, moving relativistically with no acceleration. You observe the asteroid with four-velocity u_a at space time point r_a. You observe your buddy moving with four-velocity u_b at space-time point r_b. In terms of the four-vectors u_a, u_b and $r \equiv r_a - r_b$, derive an expression for the closest distance the asteroid will come to your buddy, as measured by your buddy. The expression should only include invariants comprised of r, u_a and u_b. Note $u_a^2 = u_b^2 = 1$.