HW 2

Due: Tuesday, Sept. 11

Krane, Chapter 2, Question 1
        Problems 4, 5, 8, 10, 13, 14, 15, 18, 20

Chappell Problems:

1. (a) Show that if a particle moves at an angle θ with respect to the x axis with speed v in
        system S, it moves at an angle θ' with the x' axis in system S' given by

$$\tan \theta' = \frac{\sin \theta}{\gamma(\cos \theta - u/v)}$$

    (b) Derive a similar expression for a Galilean transformation. Does the above expression
        simplify to the Galilean result in the limit $u \ll c$? Show your work.

2. The equation for the spherical wave front of a light pulse that begins at the origin at time
        $t = 0$ is $x^2 + y^2 + z^2 - (ct)^2 = 0$. Using the Lorentz transformation, show that such
        a light pulse also has a spherical wave front in S' by showing that
        $x'^2 + y'^2 + z'^2 - (ct')^2 = 0$.