

**PHYS 622 – HOMEWORK # 2– DUE WEDNESDAY, 2/10/2010**

**Problem 1.** A runner carries a 20-m pole so fast in the direction of its length that it appears to be only 10 m long in the laboratory frame. The runner carries the pole through the front door of a barn 10 m long. Just at the instant the head of the pole reaches the closed rear door, the front door is closed, enclosing the pole within the 10-m long barn for an instant. The rear door opens and the runner goes through. From the runner's point of view, however, the pole is 20 m long and the barn is only 5 m! Thus the pole can never be enclosed in the barn. Explain qualitatively and quantitatively the apparent paradox.

**Problem 2.** In an inertial frame two events occur simultaneously at a distance of 3 m apart. In a frame moving w.r.t. laboratory frame, one event occurs later than the other by  $10^{-8}$  s. By what spatial distance are the two events separated in the moving frame?

**Problem 3.** Jackson problem 11.6.