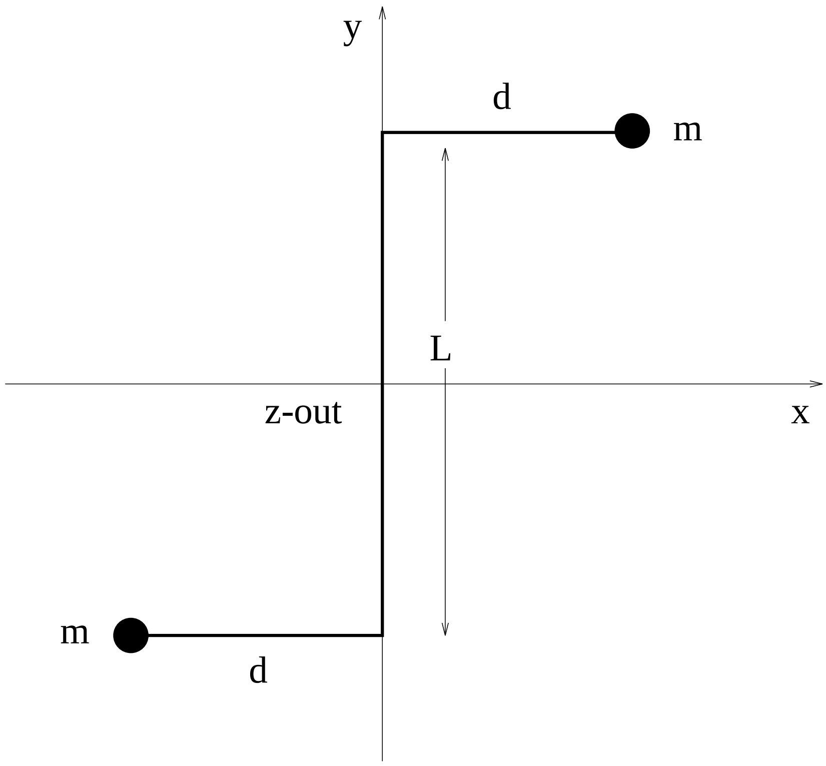
Physics 3345
Fall 2000

Professor Scalise
Assignment #11

Due: Monday 20 November 2000



1. (a) Find the moment of inertia tensor I_{ij} about the center of mass of the two masses above, which are connected by massless rigid rods, using the coordinate system indicated.
   (b) Find the principle moments of inertia (eigenvalues) and the directions of the principle axes (eigenvectors). You should find a two-fold degeneracy; choose one of the degenerate eigenvectors to be along the positive z-direction.
   (c) Describe in words the orientation of the three principle axes. Use coordinate free language. State which principle moment of inertia is associated with this axis.

2. (a) I leave my house at 8:00am (event #1), drive to Oklahoma City, and I return home at 8:00pm (event #2). Find the Lorentz-invariant spacetime interval between these two events.
   (b) Are they space-like, time-like, or light-like separated?
   (c) An alien in a flying saucer zooms by the Earth at 0.9c. When the ship is over my house at 8:00am, the alien sets her clock to 8:00am also. What will the alien's clock read when I return home?
   (d) How far away will the alien be from my house when I return home?
   (e) What interval will the alien measure between the two events?