

## **Electrodynamics III: Assignment 7**

**Due May 22 at 11:00 am.**

- 1. Scan your solutions as a single PDF file**
- 2. Name your file HW7-*Lastname*.pdf**
- 3. Attach your file to an email...**
- 4. ... with subject line HW7-*Lastname* ...**
- 5. ... and send the email to**  
**lrosenberg@phys.washington.edu**

1. Field transformations. In an unprimed frame there are **E** and **B** fields at a certain point. Find the velocity (direction and speed) of a primed frame relative to the unprimed frame where those transformed **E** and **B** fields are aligned in the same direction.

2. Starting from the Lagrangian density (Jackson eqn 12.85), show that the stationary point of the action indeed describes the two inhomogeneous Maxwell equations.

3. Show that the Minkowski-force density contains the (Euclidian) Lorentz Force.

4. In class we discussed how the Proca Lagrangian (Jackson eqn 12.91) leads to modified inhomogeneous Maxwell equations (Jackson eqn 12.92). Show that the source-free version of Jackson eqn 12.92 leads to the Klein-Gordon (-like) equation  $(\partial^\sigma \partial_\sigma + \mu^2)A^\nu = 0$ .