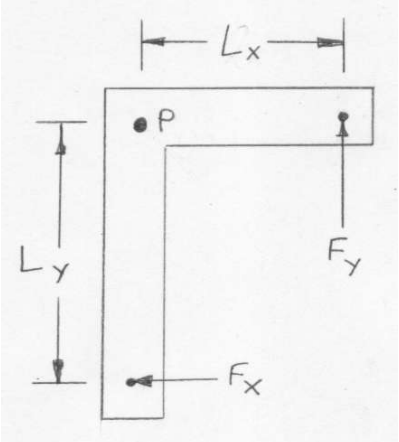
Electrodynamics III: Assignment 6
Due May 15 at 11:00 am.

1. **Scan your solutions as a single PDF file**
2. **Name your file HW6-*lastname*.pdf**
3. **Attach your file to an email…**
4. **… with subject line HW6-*lastname* …**
5. **… and send the email to ljrosenberg@phys.washington.edu**

1. Show by direct calculation that the Lorentz transformation applied to the field tensor $F\mu\nu$ gives the transformed fields of Jackson equation 11.147.

2. Show that if a divergenceless 4-vector A^μ has non-zero components in a bounded spatial region, then the Euclidian-volume integral over 3D space $\iiint A^4 dv$ is a Lorentz invariant. Hint: you may want to apply the 4D analog of Gauss's law we introduced in class. For that surface integration: since da_μ is a component of the 3D "surface" normal to the vector A^μ in 4-space, $da_4 = dv$.

3. Consider the static "Minkowski lever" from lecture, below. Suppose this system is viewed by an observer moving in the direction of one of the arms at speed *v*.
a. What's the torque according to the moving observer?
b. Explain the principle that forbids the system from undergoing rotation in one inertial frame and not undergoing rotation in another inertial frame.
c. Explain how you can reconcile the result of part a and part b.



4. Show from tensor algebra that the field tensor $F\mu\nu$, and therefore the fields, is invariant under the covariant form of the gauge transformation.

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