Problem 1. A few checks on the vector potential for a current loop.

Like in class, consider the vector potential $A_\phi(r, \theta)$ of a circular current loop, as given in eqn. (5.36) of Jackson. Expand the integrand in powers of a/r (large r!) and carry out the integral to find the first *two leading* terms in the expansion of A_ϕ. Confirm that the first term coincides with the magnetic dipole potential in (5.55). Verify that your second term in the large r expansion of A_ϕ coincides with the prediction of (5.46).

The following three problems are bonus problems. They are quite hard and you do not have to turn in solutions for these, but make sure to look at them and think about them. Their solutions will be posted later.

Problem 2. Scalar potential for current loops. Jackson 5.1.

Problem 3. Jackson 5.2.

Problem 4. Jackson 5.3