PHY531 Problem Set 7, final exam fodder, do not turn in.

1. In its rest frame a static charge distribution is given by the spherical charge distribution

$$\begin{aligned} \rho(\boldsymbol{r},t) &= \begin{cases} \frac{3Q}{4\pi a^3} & r<a \\ 0 & r>a \end{cases} \\ \boldsymbol{J}(\boldsymbol{r},t) &= 0\,. \end{aligned} \tag{1}$$

   Calculate the Lorentz gauge scalar and vector potentials in a frame where the charge distribution is moving with velocity $v\hat{\boldsymbol{x}}$, and explain how to calculate the electric and magnetic fields from the potentials.

2. Jackson problem 11.7

3. Jackson problem 11.13

4. Jackson problem 11.16

5. Jackson problem 11.30

6. Jackson problem 11.31