

4. In a certain region of space, we have the potentials

$$V = 0 \quad \text{and} \quad \mathbf{A} = -\frac{\rho t r}{3\epsilon_0} \hat{\mathbf{r}}.$$

- (a) What is the electric field \mathbf{E} in this region?
- (b) What is the magnetic field \mathbf{B} in this region?
- (c) Given the gauge function

$$\lambda = -\frac{\rho t}{6\epsilon_0}(3R^2 - r^2)$$

find the new potentials V' and \mathbf{A}' .

- (d) What is (are) the source(s) that created these potentials? (Note: the electric field gives the best hint because we saw this last semester.)
- (e) After the transformation, are we working in the Coulomb gauge, the Lorentz gauge, or both?