11.13 (a) Assume the wire is along the z-direction, then

$$\vec{E}' = \frac{2q_0}{r'}\hat{r}, \quad \vec{B}' = 0,$$

where r' is the distance from the wire. Then, apply the Lorentz transform for $\vec{\beta} = \vec{v}/c$ along z-direction. We have $\vec{E} = \gamma\vec{E}' = \frac{2\gamma q_0}{r}\hat{r}$, $\vec{B} = \gamma\vec{\beta}\times\vec{E}' = \frac{2\gamma\beta q_0}{r}\hat{\phi}$. Here, $r' = r$, as it is the transverse distance

(b) In the lab frame, the wire is moving in the z-direction with velocity $\vec{v}$. Then, unit length in the frame moving with the wire becomes $\sqrt{1-\beta^2}$ in the lab frame. Therefore, the charge density in the lab frame becomes $q_0/\sqrt{1-\beta^2} = \gamma q_0$, and the current density is $\gamma q_0\vec{v}$. In the rest frame, the charge density is q_0 and the current density is 0.

(c) The electric and magnetic field can be easily determined due to cylindrical symmetry.

$$\vec{E} = \frac{2\gamma q_0}{r}\hat{r}, \quad \vec{B} = \frac{2\gamma\beta q_0}{r}\hat{\phi},$$

identical to those part (a).