DUE: TUESDAY, FEBRUARY 7, 2023

1. Jackson, problem 11.10

2. Jackson, problem 11.13

3. Jackson, problem 11.15

4. Jackson, problem 11.18

5. Jackson, problem 11.27

HINT: In part (b) of problem 5, the following trick will be useful. Note that if if $\rho' = 0$, then by the continuity equation $\vec{\boldsymbol{J}}'$ is a steady current; that is, $\vec{\boldsymbol{\nabla}}' \cdot \vec{\boldsymbol{J}}'(\vec{\boldsymbol{x}}') = 0$. It then follows that

$$J'^i = \nabla'_k (J'^k x'^i) - x'^i \, \vec{\boldsymbol{\nabla}}' \cdot \vec{\boldsymbol{J}}' = \nabla'_k (J'^k x'^i) \,. \tag{1}$$

You can use eq. (1) in evaluating an integral involving J'^i by employing an integration by parts.