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.