Homework Assignment #27

(due Nov 9, 2022, at the beginning of class)

1. Griffiths 5.23

   Hint: To determine $\vec{A}$ you will need $\int \frac{\mathrm{d}x}{\sqrt{a^2+x^2}} = \ln(x + \sqrt{a^2+x^2})$ To determine $\vec{B}$ use cylindrical coordinates. To get to Eq. (5.37) you can use that $(z_2 + \sqrt{s^2+z_2^2})\,(z_2 - \sqrt{s^2+z_2^2}) = z_2^2 - (s^2+z_2^2) = -s^2$. Therefore for each term of your expression, multiply and devide by the necessary factor.

2. Griffiths 5.24

   Hint: First determine $\vec{B}$ and then $\vec{J}$

3. Griffiths 5.26

   Hint: We cannot use Eq.(5.66) because the current is not zero at infinity. Instead make the Ansatz $\vec{A} = A(s)\,\hat{\mathbf{z}}$. Determine first $\vec{B}$ and then determine $A(s)$ needed to get $\vec{B}$.