

Homework Assignment #11

(due Mo, Sep 19, 2022, at the beginning of class)

1. Griffiths 2.25

Hints for 2.25 (b): Use $\int \frac{dx}{\sqrt{a^2+x^2}} = \ln(x + \sqrt{a^2+x^2})$

Use also the following simplification

$$\begin{aligned} \frac{(L + \sqrt{z^2 + L^2})}{(\sqrt{z^2 + L^2} - L)} &= \frac{(L + \sqrt{z^2 + L^2})}{(\sqrt{z^2 + L^2} - L)} \frac{(\sqrt{z^2 + L^2} + L)}{(\sqrt{z^2 + L^2} + L)} \\ &= \frac{(L + \sqrt{z^2 + L^2})^2}{(z^2 + L^2) - L^2} = \left(\frac{(L + \sqrt{z^2 + L^2})}{z} \right)^2 \end{aligned}$$

and use a similar simplification to rewrite \vec{E} to compare with the result of Example 2.4 on page 64 in the book.

2. Griffiths 2.28

Hints: choose field point P on z-axis; use law of cosines; ensure that $\sqrt{\dots}$ is positive.

3. Griffiths 2.30 b

4. Griffiths 2.34 a,b