Lesson 0 – Before You Begin

0.0 Introduction

The text for this course is *Electricity and Magnetism: Theory and Applications*.

0.1 Notation

To make the text a little more reader friendly, I have added a few notational items.

The material in this text is divided into three basic types: explanations, derivations, and examples. The most important thing is for you to understand the explanations. Examples, of course, help you learn how the concepts and equations can be applied to problems. Derivations are important since they demonstrate why the mathematical equations work. I do want you to follow the derivations carefully, but I will not expect you to reproduce them on the tests. Just so that you are clear about what passages are derivations, I will put a dashed gray line along the left margin as I have done for this paragraph.

Things to Remember:

At the end of each section I have made a list of “Things to Remember.” These are the things I expect you to know for the quizzes and tests. To make it easier to find these sections, I have put a red line to the side of them.

To make the most significant equations easier to find and use, I have put them in a box with each variable described and its units given.

(1.1 Thread force) \[ \vec{F} = \frac{e}{\varepsilon_0} q_f \vec{\ell}_0 \nu_0 \]

where:
- \( \vec{F} \) is the force on the test charge in newtons (N), a vector.
- \( e \) is the charge of an electron in coulombs (C).
- \( \varepsilon_0 \) is a constant that we will determine later.
- \( q_f \) is the charge of the field particle in coulombs (C).
- \( \vec{\ell}_0 \) is the length of a thread in meters (m), a vector.
- \( \nu_0 \) is the density of threads in threads per cubic meter (number / m\(^3\), or m\(^{-3}\)).
On occasion, I want you to take a few minutes to think about concepts in the text before you go on. These questions are included in a box, such as the one below:

Think About It

If we rub a glass rod with silk and place it near (but not touching) a thin stream of water flowing from a faucet, the water is attracted to the rod. What does that tell us about the charge on the water?

If we rub a rubber rod with fur and do the same thing, the water is also attracted. Do you have to rethink your first answer? Can you explain why this happens?

Example 0.1. Examples.

I place the examples between horizontal lines.