Week 9 Worksheet
Magnetostatics!

Jacob Erlikhman

March 16, 2026

Exercise 1. The Lorentz force law for a particle of charge q moving with velocity $\mathbf{v}$ in a magnetic field $\mathbf{B}$ is given by

$$F_{\text{mag}} = q\mathbf{v} \times \mathbf{B}.$$

Find an expression for the work that the magnetic force does on the particle.

Exercise 2. Find the magnetic field and vector potential due to a current which flows with constant surface density $\mathbf{K}$ along the surface of an infinite cylinder of radius a in the following directions:

a) along the axis of the cylinder;

b) perpendicular to the axis of the cylinder;

c) at an angle α to the axis of the cylinder.