

PHY2021 Electromagnetism I

Week 8 Problems: Magnetostatics & Magnetic Potentials

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November 13, 2020

1. (a) Write down the differential form of Ampere's Law.
(b) Using Stoke's theorem, convert this to the integral form of Ampere's law.
2. Calculate the magnetic field a distance s from a long straight wire carrying a steady current I using
 - (a) The Biot-Savart law, then
 - (b) Ampere's law
3. Find the magnetic field of a long solenoid, consisting of n closely wound turns per unit length on a cylinder of radius R , each carrying a steady current I .
4. Using the Biot-Savart law, calculate the magnetic field \mathbf{B} a distance z above the centre of a wire loop forming an equilateral triangle with side lengths ℓ , carrying a constant current I .