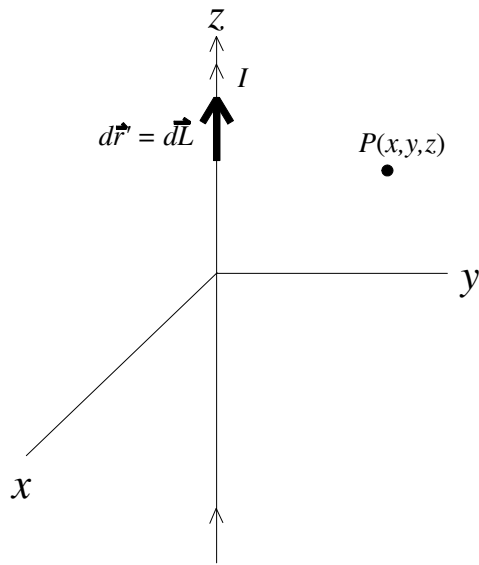


Engineering 6813 Tutorial 2 Fall, 2009

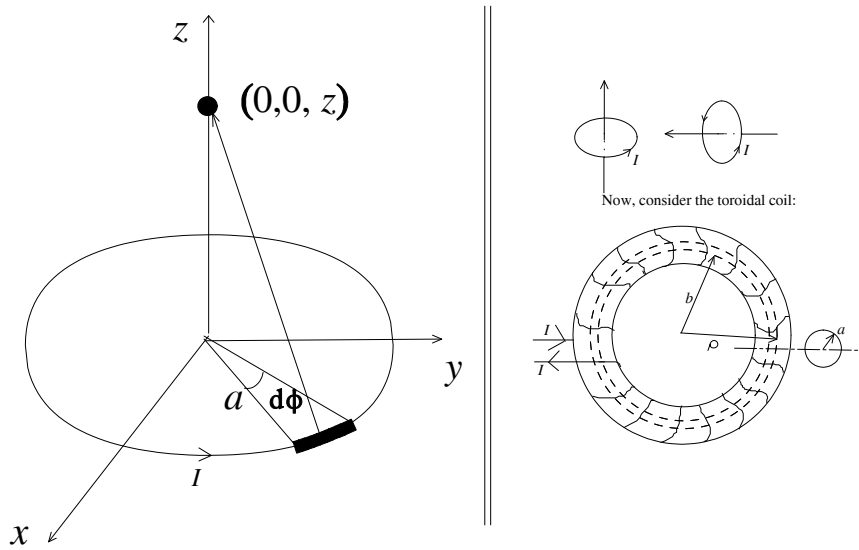
Be sure to consider all examples of the Biot-Savart law and Ampère's law in Chapter 8 of the text.

1. The purpose of this question is to illustrate the relative complexities of the Biot-Savart law and Ampère's law.

A filamentary current I lies along the entire z -axis. Determine the magnetic field intensity \vec{H} in the space surrounding the wire by using (a) the Biot-Savart law and (b) Ampère's law.



2. Consider the current-carrying loop of radius a centred on the origin in the x - y plane as shown. Use the Biot-Savart law to determine the magnetic field at $(0, 0, z)$ and also at the centre of the loop. Use this information to explain the utility of a tightly wound toroidal solenoid (with an air core and N turns) as a useful inductive circuit element for applications where stray magnetic fields may be an important issue.



3. A magnetic field flux density is given by $\vec{B} = \hat{z} \frac{\cos \phi}{\rho}$. Verify Stoke's theorem for a a sement of a cylindrical surface defined by $\rho = 2$, $\pi/3 \leq \phi \leq \pi/2$, and $0 \leq z \leq 3$.

