

Homework 9

Physics 112A

Problem 5.37 A circular loop of wire, with radius R , lies in the xy plane (centered at the origin) and carries a current I running counterclockwise as viewed from the positive z -axis.

(a) What is its magnetic dipole moment ?

$$\begin{aligned} m &= I \int da' \\ &= \boxed{I\pi R^2 \hat{z}} \end{aligned}$$

(b) What is the (approximate) magnetic field at point far from the origin ?

(c) Show that, for points on the z -axis, your answer is consistent with the exact field (Ex. 5.6), when $z \gg R$.