

Homework No. 06 (2021 Spring)

PHYS 420: ELECTRICITY AND MAGNETISM II

Department of Physics, Southern Illinois University–Carbondale

Due date: Friday, 2021 Mar 19, 2:00 PM

0. Keywords for finding resource materials: Multipole expansion, Dirac string.
1. **(20 points.)** Determine the total magnetic dipole moment for the following configuration. The current in the loop is I and each fold in the loop is of length a .

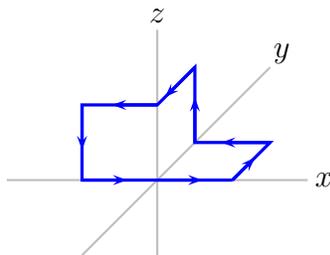


Figure 1: Problem 1

2. **(20 points.)** Find the total magnetic dipole moment of a helical coil carrying current I and n turns per unit length, bent in the shape of half-torus of major radius R and minor radius a . Assume the coil to be tightly wound so that each current loop can be assumed to be a circle of radius a .