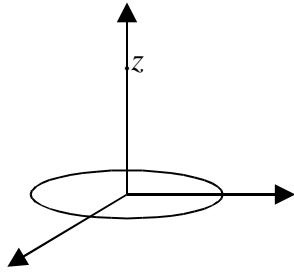


# EE 151 Homework 1

1. Problem 3.12 from the textbook.
2. Find the electric field at a point a distance  $z$  above the center of a circular loop of radius  $R$ , which carries a uniform line charge density  $\lambda$ .



3. Calculate the magnetic field for two concentric solenoids of radii  $R_1$  and  $R_2$  ( $R_1 < R_2$ ). The solenoids have  $N_1$  and  $N_2$  turns per unit length, and currents  $I_1$  and  $I_2$ . Assume the solenoids are very long and the windings are very close together. Find the field for the three regions,  $r < R_1$ ,  $R_1 < r < R_2$ , and  $r > R_2$ .

4. A conducting sliding bar oscillates over two parallel conducting rails in a sinusoidally varying magnetic field  $\mathbf{B} = n_z 5 \cos \omega t$  [mT], as shown in the Figure 4. The position of the sliding bar is given by  $x = 0.5(1 - \cos \omega t)$  [m], and the rails are terminated with a resistance  $R = 0.2$  [ $\Omega$ ]. Find the current  $i$  in the loop.

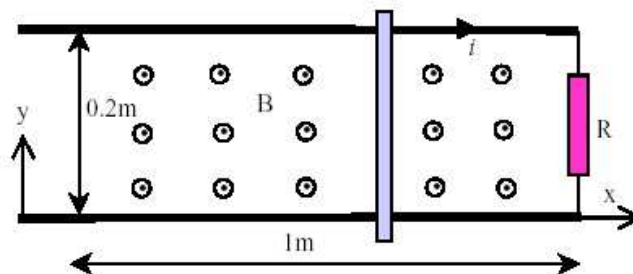


Figure 4