

# Assignment No. 5

Physics 3P36

Due Monday, March 5, 2018

1. Textbook, Problem 5.36, p. 255
2. Textbook, Problem 5.37, p. 256
3. Textbook, Problem 5.48, p. 259
4. In the Rutherford (classical) model of hydrogen atom an electron of charge  $-e$  and mass  $m_e$  moves in a circular orbit of radius  $r$  around the nucleus. The orbital speed of the electron is  $v$ . Calculate the magnetic dipole moment  $\mathbf{m}$  of the electron resulting from this orbital motion and express it in terms of the orbital angular momentum of the electron  $\mathbf{l} = \mathbf{r} \times (m_e \mathbf{v})$
5. A uniformly charged solid sphere of radius  $R$  carries a total charge  $-e$ , and is spinning with angular velocity  $\omega$  about the  $z$  axis in counterclockwise direction. The mass of the sphere is  $m_e$ . Calculate the magnetic dipole moment  $\mathbf{m}$  of the sphere resulting from its spin and express it in terms of the orbital angular momentum of the sphere  $\mathbf{L}$