1. An electron moves at v=$3 \cdot 10^6\, m/s$ through a region in which there is a magnetic field of unspecified direction and magnitude B=$0.08\, T$ out of the page. (a) What is the largest possible magnitude of the acceleration of the electron due to the magnetic field and the direction of revolution? (b) what is the period of revolution? (c) What is the smallest acceleration?

2. What is the speed of a beam of electrons when the simultaneous influence of an electric field $E = 1.56 \times 10^4\, V/m$ and a magnetic field $B = 4.62 \times 10^3\, T$, with both fields normal to the beam and to each other, produces no deflection of the electrons?

3. A straight, vertical wire carries a current of 1.23 A downward in a region between the poles of a large superconducting electromagnet, where the magnetic field has a magnitude of B = 0.557 T and is horizontal.
   (a) What is the magnitude of the magnetic force on a section of the wire with a length of 1.00 cm that is in this uniform magnetic field, if the magnetic field direction is east?
   (b) What is the direction of the magnetic force on a section of the wire with a length of 1.00 cm that is in this uniform magnetic field, if the magnetic field direction is east?
   ANSWER:
   south
   north
   west
   east

4. The plane of a rectangular loop of wire with a width of 5.0 cm and a height of 8.0 cm is parallel to a magnetic field of magnitude 0.17 T . The loop carries a current of 6.6 A . (a) What torque acts on the loop?
   (b) What is the magnetic moment of the loop?

5. A singly charged ion of 7Li (an isotope of lithium) has a mass of 1.16×10^{-26} kg . It is accelerated through a potential difference of 290 V and then enters a magnetic field with magnitude 0.730 T perpendicular to the path of the ion, out of the page.
   (a) find the direction and radius of the revolution
   (b) find the frequency of revolution

6. A solid conductor with radius a is supported by insulating disks on the axis of a conducting tube with inner radius b and outer radius c. The central conductor and tube carry equal currents I in opposite directions.
   (a) Derive an expression for the magnitude of the magnetic field at points outside the central, solid conductor but inside the tube ($a < r < b$).
   (b) Derive an expression for the magnitude of the magnetic field at points outside the tube ($r > c$).

7. A magnetic field of 37.2 T has been achieved at the MIT Francis Bitter National Magnetic Laboratory. Find the current needed to achieve such a field (a) 2.0 cm from a long, straight wire
   (b) at the center of a circular coil of radius 42 cm that has 100 turns
   (c) inside of a solenoid with radius 2.6 cm , length 34 cm , and 40,000 turns