Multiple Choice (1 point each)

_a_ 1. Two capacitors, \( C_1 \) and \( C_2 \) are connected in series with a battery of potential difference \( V \),
   a. each capacitor has the same magnitude charge on its plates.
   b. each capacitor has the same potential difference across its plates.
   c. the charge on \( C_1 \) is more than the charge on \( C_2 \) if \( C_1 \) is larger than \( C_2 \).
   d. both a and b are correct.

_b_ 2. Two capacitors, \( C_1 \) and \( C_2 \) are connected in parallel with a battery of potential difference \( V \),
   a. each capacitor has the same magnitude charge on its plates.
   b. each capacitor has the same potential difference across its plates.
   c. the potential difference across \( C_1 \) is more than potential difference across \( C_2 \) if \( C_1 \) is larger than \( C_2 \).
   d. both a and b are correct.

_c_ 3. A proton, moving north, enters a magnetic field of a certain strength. Because of this field the proton curves downward. What is the direction of the magnetic field? (downward here is toward the earth, upward is toward the sky)
   a. downward
   b. upward
   c. towards the east
   d. towards the west

_d_ 4. Which one of the following statements concerning the magnetic force on a charged particle in a magnetic field is true?
   a. It is a maximum if the particle is stationary.
   b. It is zero if the particle moves perpendicular to the field.
   c. It is a maximum if the particle moves parallel to the field.
   d. It depends on the component of the particle's velocity that is perpendicular to the field.

_d_ 5. Which one of the following statements concerning a charged particle moving in a magnetic field is true?
   a. The speed of the particle is changed.
   b. The kinetic energy of the particle is changed.
   c. Both statements are correct.
   d. Both statements are incorrect.

Problem (5 points)

In a velocity selector, a uniform magnetic field of 1.5 T is supplied from a large magnet. Two parallel plates with a separation distance of 1.5 cm produce a perpendicular electric field. What voltage should be applied across the plates so that a singly charged ion traveling at a speed of \( 8 \times 10^4 \) m/s will pass through un-deflected. (see class lecture note)