1. A bar magnet is broken in half. Each half is broken in half again, etc. The observation is that each piece has both a north and south pole. This is usually explained by:
   A) Ampere's theory that all magnetic phenomena result from electric currents
   B) our inability to divide the magnet into small enough pieces
   C) Coulomb's law
   D) Lenz' law
   E) conservation of charge

2. Maxwell's great contribution to electromagnetic theory was his hypothesis that:
   A) work is required to move a magnetic pole through a closed path surrounding a current
   B) a time-varying electric flux acts as a current for purposes of producing a magnetic field
   C) the speed of light could be determined from simple electrostatic and magnetostatic experiments (finding the values of m_0 and ε_0)
   D) the magnetic force on a moving charge particle is perpendicular to both ² and 4
   E) magnetism could be explained in terms of circulating currents in atoms

3. A 1.2-m radius cylindrical region contains a uniform electric field that is increasing uniformly with time. At $t = 0$ the field is 0 and at $t = 5.0$ s the field is 200 V/m. The total displacement current through a cross section of the region is:
   A) 4.5×10^{-16} A
   B) 2.0×10^{-15} A
   C) 3.5×10^{-10} A
   D) 1.6×10^{-9} A
   E) 8.0×10^{-9} A

4. A 0.70-m radius cylindrical region contains a uniform electric field that is parallel to the axis and is increasing at the rate 5.0×10^{12} V/m · s. The magnetic field at a point 0.25 m from the axis has a magnitude of:
   A) 0
   B) 7.0×10^{-6} T
   C) 2.8×10^{-5} T
   D) 5.4×10^{-5} T
   E) 7.0×10^{-5} T

5. An electron traveling with speed v around a circle of radius r is equivalent to a current of:
   A) $evr/2$
   B) ev/r
   C) $ev/2\pi r$
   D) $2\pi er/v$
   E) $2\pi ev/r$

Answer Key --

1. A
2. B
3. D
4. B
5. C