# Physics 10164 – Exam 2B

Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work even if you get the right answer. Clearly indicate your answer with a circle or a box and remember to include correct units and significant figures.

1. (35 pts) A circuit contains a 12 Volt battery, a 4.5 Ohm resistor and an 18 μF capacitor. At t=0, the capacitor is uncharged, and a switch is closed allowing current to begin flowing to charge the capacitor.

a) After 1.5 time constants have elapsed, what is the voltage drop across the capacitor?

b) At this time, what is the voltage drop across the resistor?

c) At what time is the voltage drop across the resistor equal to the voltage drop across the capacitor?

2. (35 pts) Wires A and B are both infinite and perpendicular
to the xy-plane. Wire A passes through the origin and wire B
passes through x = 28 cm.

a) At what value of x (besides infinity) is the total magnetic
    field due to the two wires equal to zero?

b) If a proton is moving into the page through the point midway
between the two wires, what will be the magnitude and direction
of the magnetic force acting on the proton?

28 cm

I(A) = 3.4 Amps

I(B) = 2.1 Amps
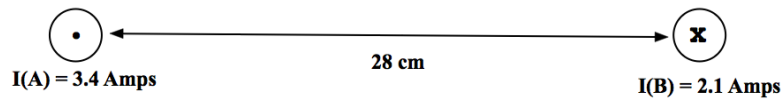
#3. (30 pts) A long straight wire carries a current of 15 Amps. A square wire loop with a clockwise current of 6.2 Amps is placed in the vicinity of the long, straight wire as shown below.

a)   What is the magnitude and direction of the net magnetic force on the wire loop?

b)   What is the magnitude of the net torque on the wire loop?