

Name (printed) \_\_\_\_\_

Name (signature as on ID) \_\_\_\_\_

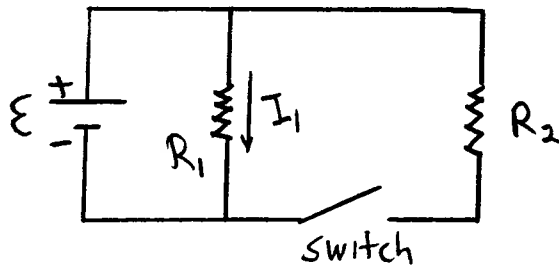
Lab Section \_\_\_\_\_

Exam II Chaps. 19–21 in Young&Geller

Multiple choice questions. Circle the correct answer. No work needs to be shown and no partial credit will be given.

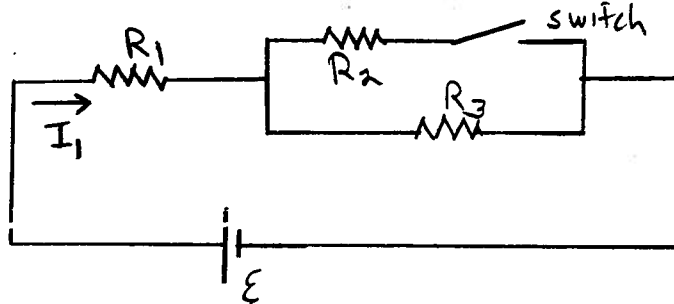
(5 pts) 1. Consider the circuit shown in the sketch. The battery has no internal resistance. When the switch is closed, what happens to the current  $I_1$  through resistor  $R_1$ ?

- (a) doesn't change
- (b) decreases
- (c) increases
- (d) becomes zero



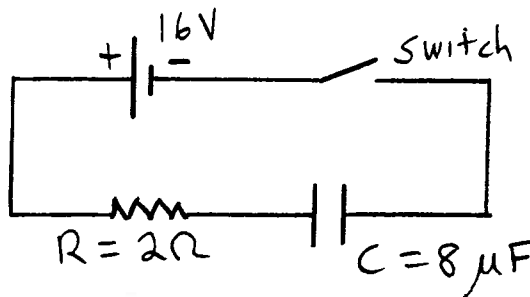
(5 pts) 2. Consider the circuit shown in the sketch. The battery has no internal resistance. When the switch is closed, what happens to the current  $I_1$  in resistor  $R_1$ ?

- (a) doesn't change
- (b) decreases
- (c) increases
- (d) becomes zero



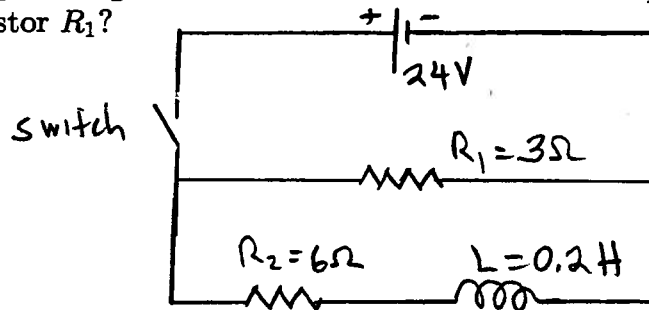
(5 pts) 3. Consider the circuit shown in the sketch. At time  $t$  after the switch is closed, the charge on the capacitor is  $48.0 \times 10^{-6}$  C. At that instant the current in the resistor is

- (a) 5.0 A
- (b) 6.0 A
- (c) 7.0 A
- (d) 8.0 A
- (e) zero



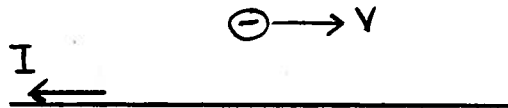
(5 pts) 4. Consider the circuit shown in the sketch. After the switch has been closed a long time it is opened again. Just after the switch has been opened, what is the current through the resistor  $R_1$ ?

- (a) 4.0 A
- (b) 8.0 A
- (c) 12.0 A
- (d) zero



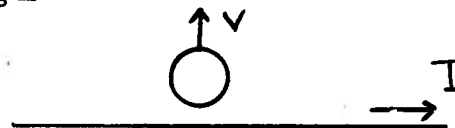
(5 pts) 5. An electron (charge  $-e$ ) is moving in the vicinity of a long-straight wire. The current in the wire is to the left. At the instant that the electron is moving to the right, the direction of the force that the wire exerts on it is

- (a) toward the wire
- (b) away from the wire
- (c) to the left
- (d) to the right
- (e) into the page
- (f) out of the page
- (g) the force is zero and therefore has no direction



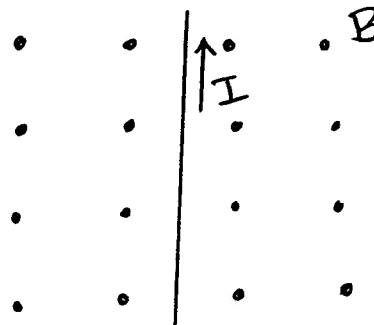
(5 pts) 6. A copper ring with resistance  $R$  is moving away from a long straight wire with constant speed  $v$ . The current in the wire is directed to the right, as shown in the sketch, and is constant. The current induced in the ring is

- (a) counterclockwise
- (b) clockwise
- (c) zero



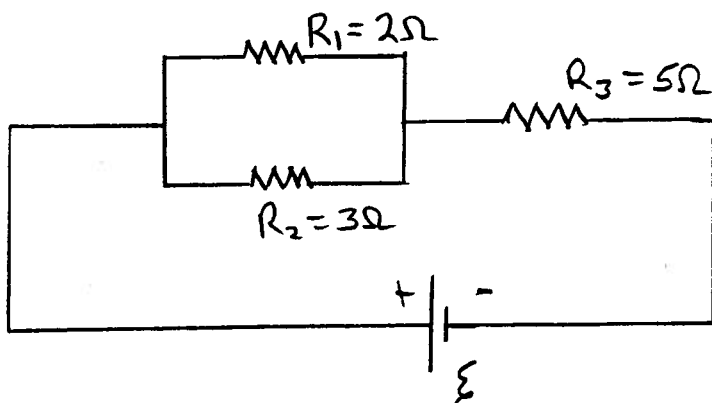
(5 pts) 7. A segment of wire carries current in the direction shown in a magnetic field that is directed out of the page. The direction of the force that the field exerts on the wire is

- (a) to the left
- (b) to the right
- (c) into the page
- (d) out of the page
- (e) toward the top of the page
- (f) toward the bottom of the page



Show all your work for partial credit. Write your answers in the blanks provided.

(15 pts) 8. Consider the circuit shown in the sketch. Resistor  $R_1$  is dissipating electrical energy at the rate  $P = 32.0$  W. What is



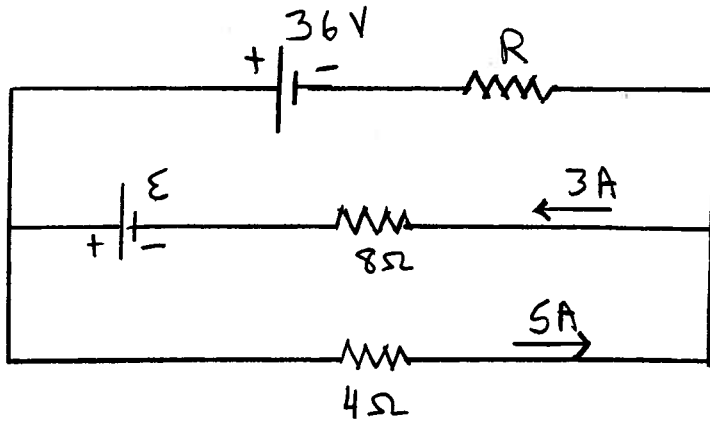
a) the current  $I_3$  through resistor  $R_3$ ?

Ans. \_\_\_\_\_

b) the emf of the battery?

Ans. \_\_\_\_\_

(18 pts) 9. Consider the circuit shown in the sketch. Note that two currents are shown. What is



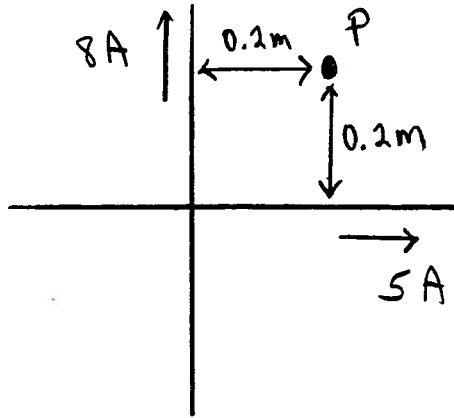
a) the value of  $R$ ?

Ans. \_\_\_\_\_

b) the emf  $\epsilon$  ?

Ans. \_\_\_\_\_

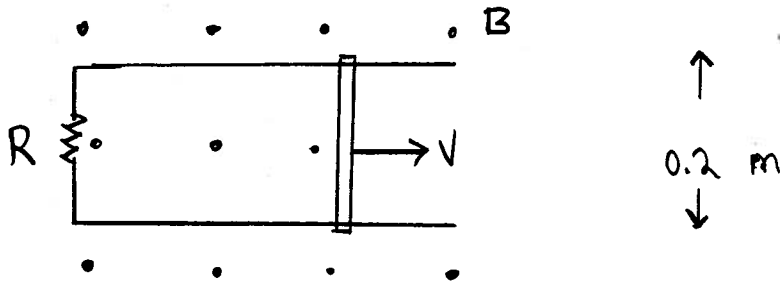
(15 pts) 10. Two long straight wires carry currents in perpendicular directions, as shown in the sketch. Point  $P$  is 0.20 m from each wire. What are the magnitude and direction of the net magnetic field at point  $P$  due to the two wires?



Ans.  $B =$  \_\_\_\_\_

direction \_\_\_\_\_

(17 pts) 11. A conducting rod of length 0.20 m makes frictionless contact with metal rails, as shown in the sketch. The apparatus is in a uniform magnetic field of  $B = 0.30 \text{ T}$ , directed out of the page. The resistance of the circuit is a constant  $R = 4.0 \Omega$ .



a) At the instant that the bar is moving to the right at a speed of  $8.0 \text{ m/s}$ , what are the magnitude and direction (clockwise or counterclockwise) of the induced current in the circuit?

Ans.  $I =$  \_\_\_\_\_  
 direction \_\_\_\_\_

b) What magnitude of external force must be applied to the bar to keep it moving to the right at a constant speed of  $8.0 \text{ m/s}$ ?

Ans. \_\_\_\_\_