Exam 2 Thursday 5:00 in PS 239

Bring notes on one side of an 8½"x 11" sheet of paper
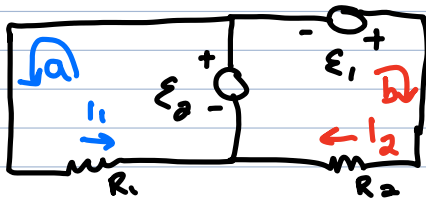
$\varepsilon_1 = 10\,V$ $\varepsilon_2 = 20\,V$
$R_1 = 10\,\Omega$ $R_2 = 50\,\Omega$

loop rule for a: $\Delta V = 0 \implies \varepsilon_2 - I_1 R_1 = 0 \implies I_1 = \dfrac{\varepsilon_2}{R_1} = 2A$

loop rule for b: $\Delta V = 0 \implies \varepsilon_1 - I_2 R_2 + \varepsilon_2 = 0 \implies I_2 = \dfrac{\varepsilon_1 + \varepsilon_2}{R_2} = 0.6A$

R_{eq} in parallel situations
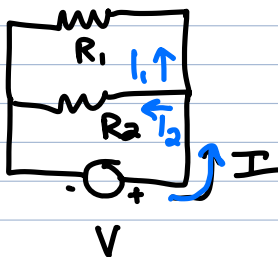
$V = V_1 = V_2$ and $I = I_1 + I_2$

$\implies \dfrac{V}{R_{eq}} = \dfrac{V}{R_1} + \dfrac{V}{R_2} \implies \dfrac{1}{R_{eq}} = \dfrac{1}{R_1} + \dfrac{1}{R_2}$

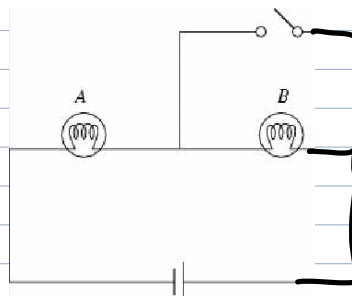If the four light bulbs are identical, which circuit puts out more light?
a) I
b) II
c) They emit the same amount

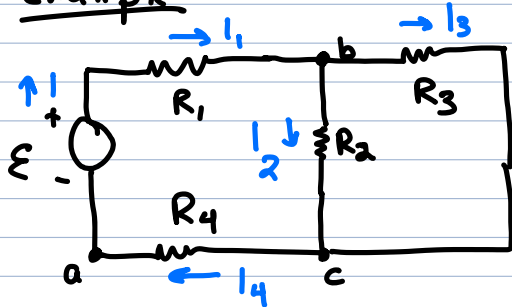circuit I   circuit II

12 V   12 V
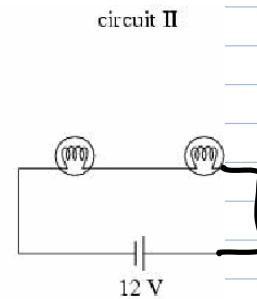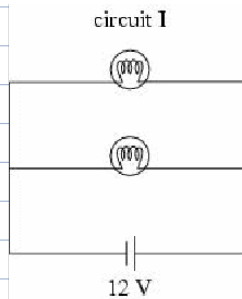
Concept Q #2 ch 10

The circuit shows two identical bulbs glowing with equal brightness. When the switch is closed, the brightness of bulb A
a) increases.
b) decreases.
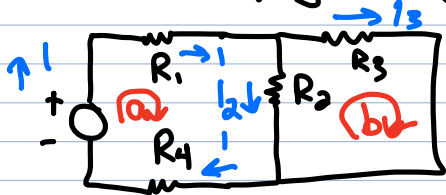c) remains the same.
d) not enough information

concept Q #3

<u>example</u>

What is I through the battery?

$\mathcal{E} = 12V \quad R_1 = R_2 = 20\,\Omega \quad R_3 = 30\,\Omega$
$\qquad\qquad\qquad\qquad\qquad R_4 = 80\,\Omega$

- Draw picture and label it
- Use junction rule to eliminate extraneous subscripts on currents
- Pick a mini-circuit loop and apply $\Sigma V = 0$
- Continue looping through mini-circuits until all elements covered

a) $\Sigma V = 0 : \mathcal{E} - IR_1 - I_2 R_2 - I R_4 = 0$

b) $\Sigma V = 0 : -I_3 R_3 + I_2 R_2 = 0$

c) $\Sigma I = 0$ at point b : $I = I_2 + I_3$

3 equations, 3 unknowns ✓

a) $\Rightarrow I_2 = \dfrac{\mathcal{E} - I(R_1 + R_4)}{R_2}$

b) $I_3 = I_2 \dfrac{R_2}{R_3} = \dfrac{\mathcal{E} - I(R_1 + R_4)}{R_2} \cdot \dfrac{R_2}{R_3} = \dfrac{\mathcal{E} - I(R_1 + R_4)}{R_3}$

c) $I = \dfrac{\mathcal{E} - I(R_1 + R_4)}{R_2} + \dfrac{\mathcal{E} - I(R_1 + R_4)}{R_3} \Rightarrow I = \dfrac{\mathcal{E}(R_2 + R_3)}{R_2 R_3 + (R_1 + R_4)(R_2 + R_3)} = \boxed{0.107A}$