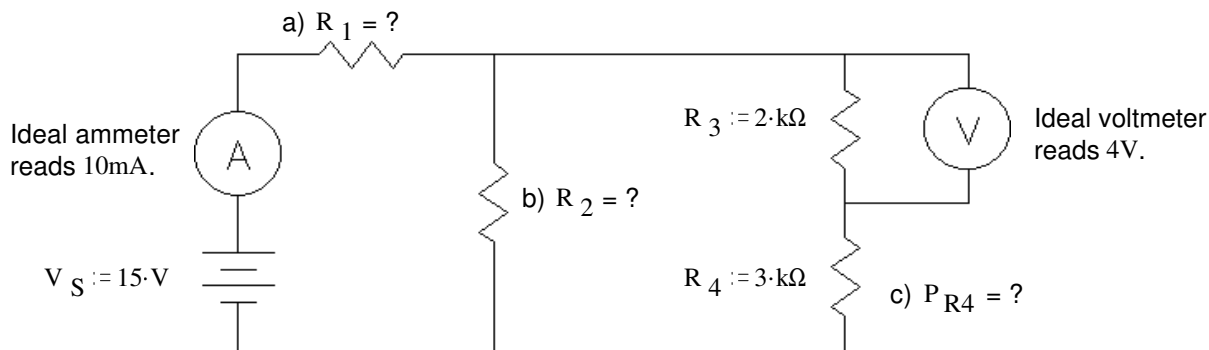# ECE 2210/00 Exam 1   given: Fall 07   (The space between problems has been removed.)

To get the most possible partial credit, always show all the intermediate values that you can calculate. If further calculations depend on a value that you can't figure out, just use a symbol (like I_{R1}) or a guessed value and proceed.

1. (19 pts) Show your work   Note: feel free to show answers & work right on the schematic
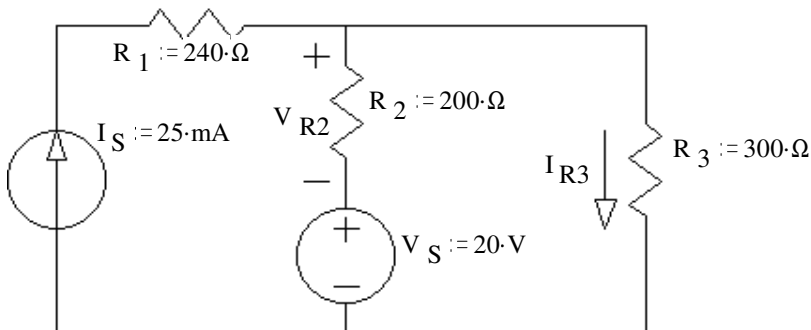
a) R_1 = ?

Ideal ammeter reads 10mA.

$V_S := 15 \cdot V$

b) R_2 = ?

c) How much power is dissipated by R_4 ? P_{R4} = ?

a) R_1 = ?

$R_3 := 2 \cdot k\Omega$

Ideal voltmeter reads 4V.

b) R_2 = ?

$R_4 := 3 \cdot k\Omega$

c) P_{R4} = ?

2. (20 pts) Use the method of superposition to find the voltage across R_2 (V_{R2}) and the current through R_3 (I_{R3}). Be sure to clearly show and **circle** your intermediate results.

$R_1 := 240 \cdot \Omega$

$I_S := 25 \cdot mA$

V_{R2}

$R_2 := 200 \cdot \Omega$

I_{R3}

$R_3 := 300 \cdot \Omega$

$V_S := 20 \cdot V$

3. (18 pts) A Lithium-Ion battery pack is used to power an MP3 Player. When the player is switched on the battery pack voltage drops from 3.80 V to 3.75 V and the player draws 10 mA.

a) Draw a simple, reasonable model of the battery pack using ideal parts. Find the value of each part.

b) When MP3 player is used to play loud music it draws 40 mA. What is the battery pack voltage now?

c) The battery pack is placed in a charger. The charger supplies 4.50 V. How much current flows into the battery pack?

4. (7 pts) Consider the circuit at right.
a) What value of load resistor (R_L) would you choose if you wanted to maximize the power dissipation in that load resistor.

$I_S := 1 \cdot A$

$R_S := 8 \cdot \Omega$

R_L
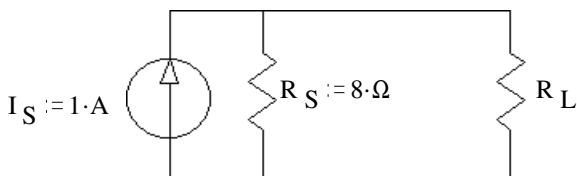
Note: If you don't know how to find this, make a guess so that you can calculate an answer for part b).
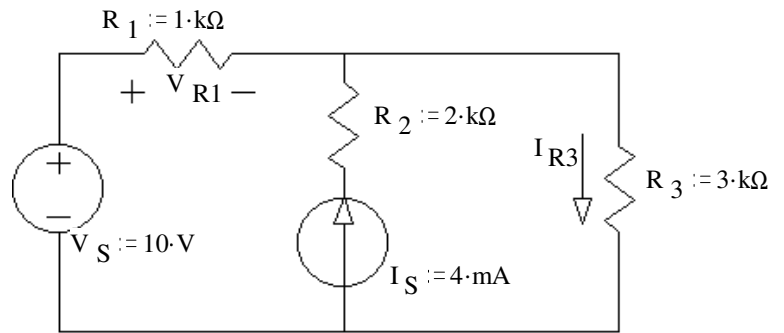
b) With that load resistor (R_L) find the power dissipation in the load.

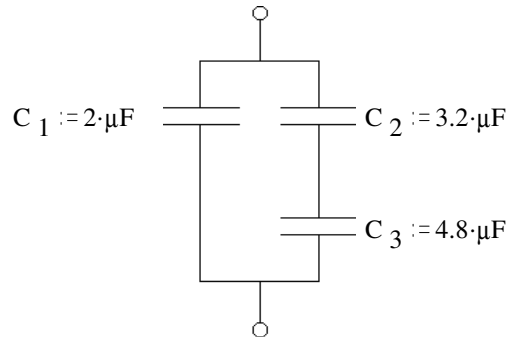**ECE 2210/00 Exam 1   Fall 07   p1**

5. (20 pts) a) Use nodal analysis to find the voltage across R_1 (V_{R1}).

   You **MUST** show all the steps of nodal analysis work to get credit, including drawing appropriate symbols and labels on the circuit shown.
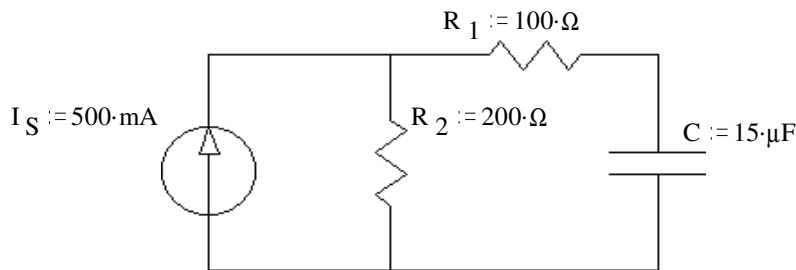
   b) Find the current through R_3 (I_{R3}).

$R_1 := 1 \cdot k\Omega$

$+ \; V_{R1} \; -$

$R_2 := 2 \cdot k\Omega$

I_{R3}

$R_3 := 3 \cdot k\Omega$

$V_S := 10 \cdot V$

$I_S := 4 \cdot mA$

6. (8 pts) Find C_{eq} between the terminals.

$C_1 := 2 \cdot \mu F$
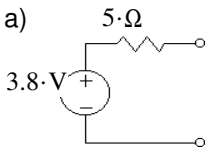
$C_2 := 3.2 \cdot \mu F$

$C_3 := 4.8 \cdot \mu F$

7. (8 pts) The following circuit has been connected as shown for a long time. Find the voltage across the capacitor and the energy stored in it.
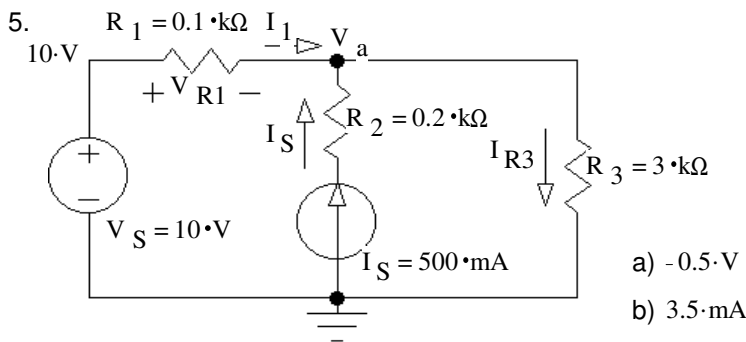
$R_1 := 100 \cdot \Omega$

$I_S := 500 \cdot mA$

$R_2 := 200 \cdot \Omega$

$C := 15 \cdot \mu F$

Answers

1. a) $500 \cdot \Omega$ b) $1.25 \cdot k\Omega$ c) $12 \cdot mW$

2. $50 \cdot mA$ $-5 \cdot V$

3. a) $5 \cdot \Omega$ b) $3.6 \cdot V$

   $3.8 \cdot V$ c) $140 \cdot mA$

4. a) $8 \cdot \Omega$ b) $2 \cdot W$

5. $R_1 = 0.1 \cdot k\Omega$ I_1 V_a

   $10 \cdot V$

   $+ \; V_{R1} \; -$

   I_S $R_2 = 0.2 \cdot k\Omega$

   I_{R3} $R_3 = 3 \cdot k\Omega$

   $V_S = 10 \cdot V$

   $I_S = 500 \cdot mA$ a) $-0.5 \cdot V$

   b) $3.5 \cdot mA$

6. $3.92 \cdot \mu F$ 7. $100 \cdot V$ $75 \cdot mJ$

ECE 2210 / 00   Midterm #1   Arn Stolp

Name _____

Scores:

   Pages 1&2 _____ of a possible 39 pts

   Pages 3&4 _____ of a possible 45 pts

   Page 5   _____ of a possible 16 pts

   Total _____ of a possible 100 pts