

Midterm 1

Principles of Computer Engineering I

NAME:

STUDENT ID:

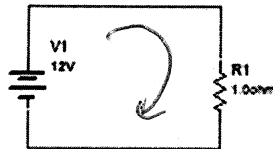
Given an atom with 35 Protons answer the following:

- (1 pts) How many electrons orbit the nucleus? 35
- (2 pts) List the shell number and the number of electrons each shell contains:

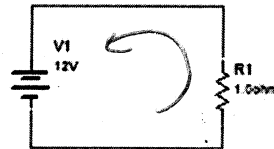
Shell #	Number of Electrons
1	2
2	8
3	18
4	7

- (1 pts) How many valence electrons are there? 7
- (1 pts) This element is a poor conductor. T / F
- (1 pts) Please indicate the direction of current for the following two drawings with an arrow and the symbol I.

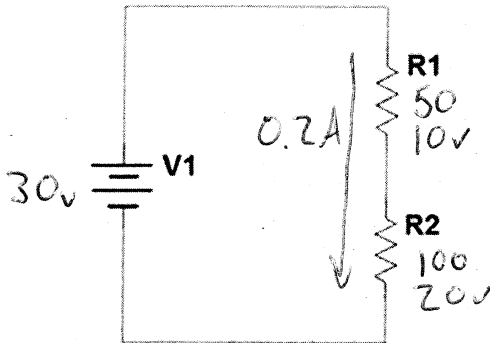
Conventional Flow



Electron Flow



- (6 pts) Given the following circuit, solve for each item in the table
 $V_1 = 30\text{V}$, $R_1 = 50\ \Omega$, $R_2 = 100\ \Omega$,

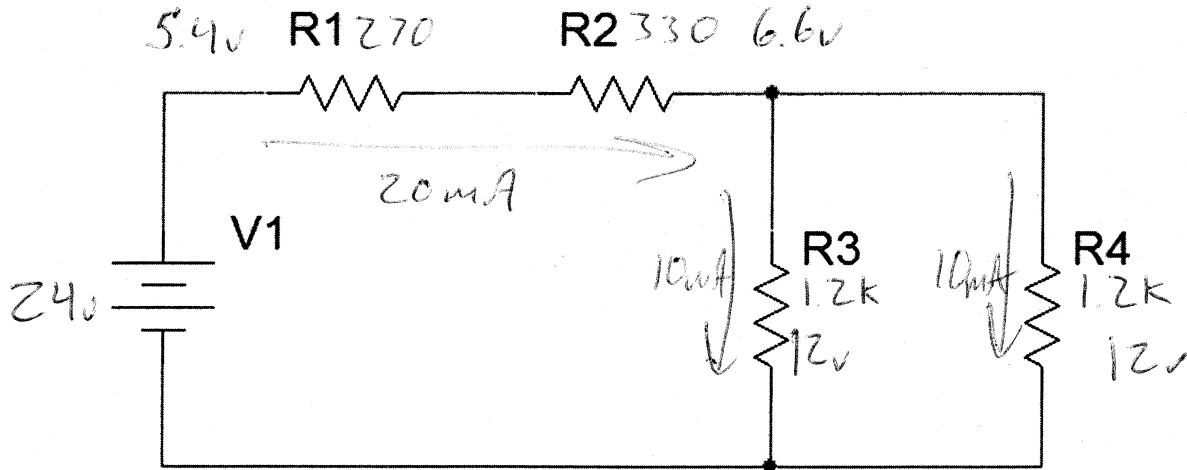


R_T	Equivalent Resistance	150
I_T	Total Current	0.2A
V_{R1}	Voltage Across R1	10V
V_{R2}	Voltage Across R2	20V
P_{R1}	Power Dissipated by R1	2W
P_{R2}	Power Dissipated by R2	4W

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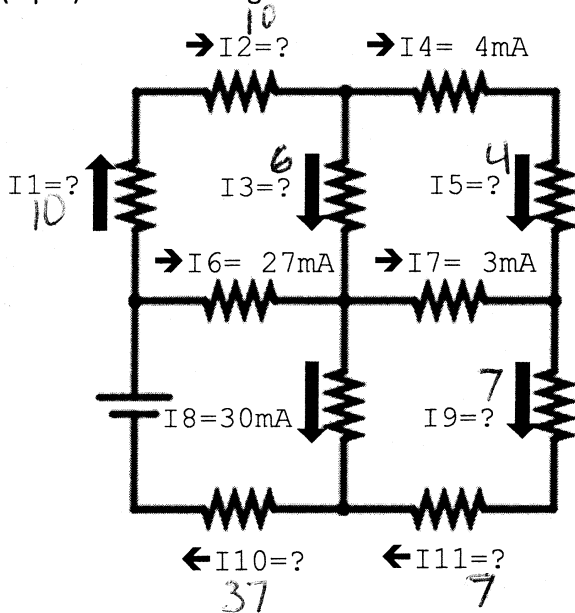
7. (12 pts) Given the following circuit, solve for each item in the table

$V_1 = 24V$, $R_1 = 270 \Omega$, $R_2 = 330 \Omega$, $R_3 = 1.2 K\Omega$ and $R_4 = 1.2 K\Omega$.



I_{R1}	20mA	V_{R3}	12v
I_{R2}	20mA	V_{R4}	12v
I_{R3}	10mA	P_{R1}	0.108W or 108mW
I_{R4}	10mA	P_{R2}	0.132W 132mW
V_{R1}	5.4v	P_{R3}	120mW
V_{R2}	6.6v	P_{R4}	120mW

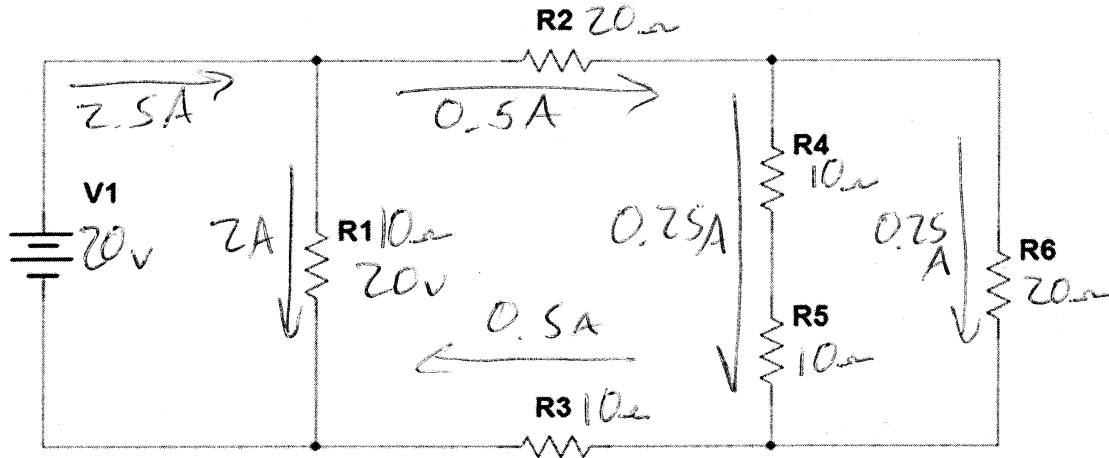
8. (7 pts) Use KCL to figure out all the currents and fill in the table below.



I_1	10mA
I_2	10mA
I_3	6mA
I_5	4mA
I_9	7mA
I_{10}	37mA
I_{11}	7mA

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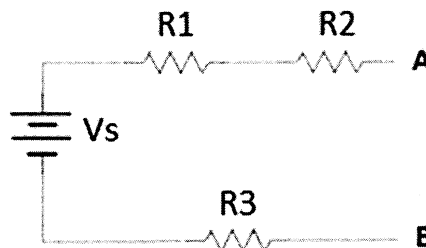
9. (12 pts) $V_1 = 20\text{v}$, $R_1 = 10\Omega$, $R_2 = 20\Omega$, $R_3 = 10\Omega$, $R_4 = 10\Omega$, $R_5 = 10\Omega$ and $R_6 = 20\Omega$.



In the circuit above find the current through and the voltage across each resistor.

I_{R1}	2 A	V_{R1}	20 v
I_{R2}	0.5 A	V_{R2}	10 v
I_{R3}	0.5 A	V_{R3}	5 v
I_{R4}	0.25 A	V_{R4}	2.5 v
I_{R5}	0.25 A	V_{R5}	2.5 v
I_{R6}	0.25 A	V_{R6}	5 v

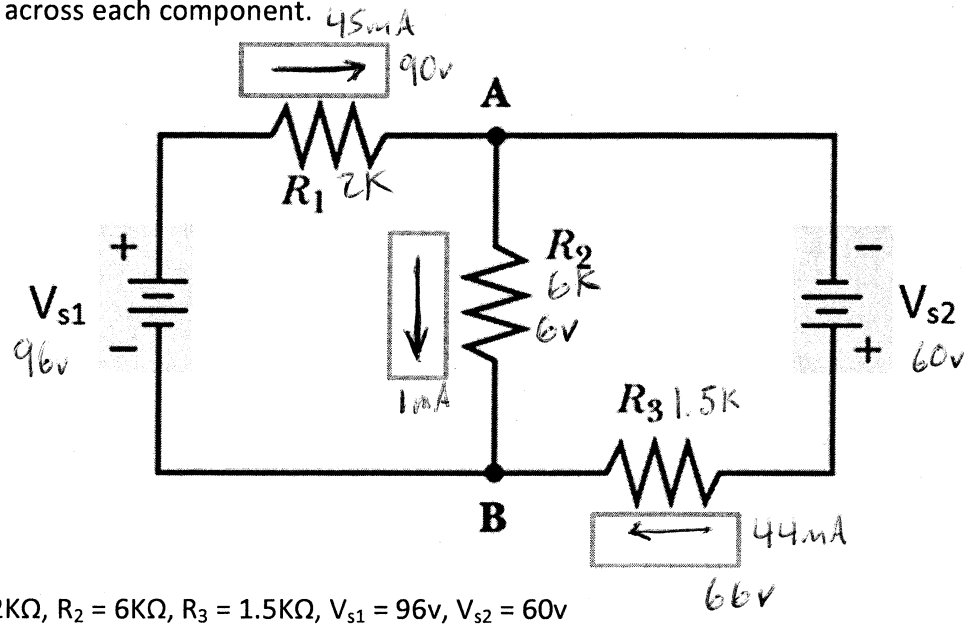
11. (2 pts) $V_s = 8\text{v}$, $R_1 = 1\Omega$, $R_2 = 1\Omega$, $R_3 = 2\Omega$



What is the voltage between points A and B? 8v

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12. (13.5pts) For the circuit below use Superposition to determine the Current through and Voltage across each component.



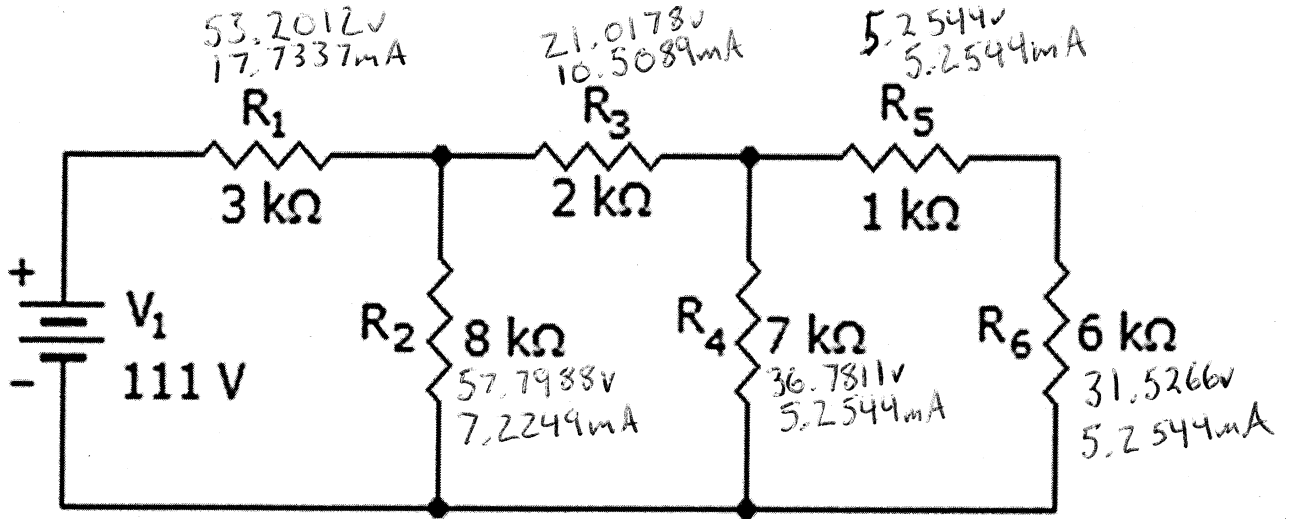
$R_1 = 2K\Omega$, $R_2 = 6K\Omega$, $R_3 = 1.5K\Omega$, $V_{s1} = 96v$, $V_{s2} = 60v$

(1.5pt) Use the provided boxes in the circuit to draw an arrow for the conventional current of each component.

- | | |
|------------------------------|-----------------------------|
| (3pt) I_{R1} : <u>45mA</u> | (1pt) V_{R1} : <u>90v</u> |
| (3pt) I_{R2} : <u>1mA</u> | (1pt) V_{R2} : <u>6v</u> |
| (3pt) I_{R3} : <u>44mA</u> | (1pt) V_{R3} : <u>66v</u> |

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13. (12pts) In the circuit below, find the current through and voltage across each resistor.

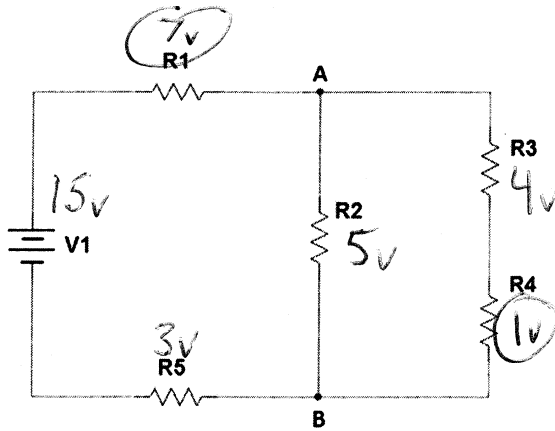


I_{R1}	17.73mA	V_{R1}	53.20V
I_{R2}	7.22mA	V_{R2}	57.80V
I_{R3}	10.51mA	V_{R3}	21.02V
I_{R4}	5.25mA	V_{R4}	36.78V
I_{R5}	5.25mA	V_{R5}	5.25V
I_{R6}	5.25mA	V_{R6}	31.53V

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14. (6 pts) $V_1 = 15\text{v}$, $V_{R5} = 3\text{v}$, $V_{R2} = 5\text{v}$, $V_{R3} = 4\text{v}$



Find V_{R4} and V_{R1}

$V_{R1} = \underline{7\text{V}}$

$V_{R4} = \underline{1\text{V}}$

How many KVL loops are there? 3