Test 1 - Fall 2008 (100pts max) - M. Cahay

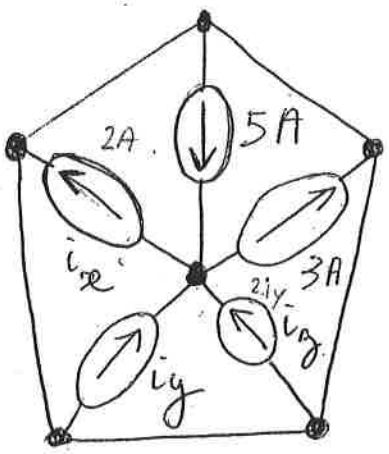
Name: Omoeye AKOMOLEDE

100/100 M. Cahay

NETWORK ANALYSIS I

October 14, 2008

I. (20 pts) In the circuit below, find i_y if $i_x = 2A$ and $i_z = 2i_y$.



$i_y + 2i_y + 5A = 3A + 2A$

$3i_y + 5A = 3A + 2A$

$3i_y = 0A$

$i_y = 0A$

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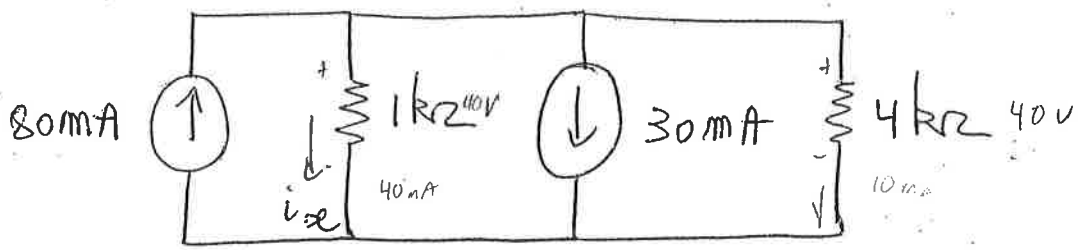
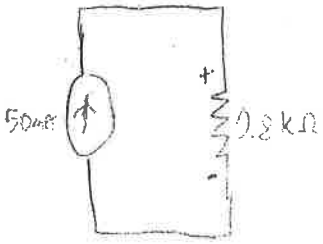
$i_y + 2i_y + 5A - 2A - 3A = 0$

II. (20 pts) In the circuit below, find the power absorbed by the 4 $k\Omega$ resistor.



$1\,k\Omega \,//\, 4\,k\Omega = \frac{1k\Omega \cdot 4k\Omega}{1k\Omega + 4k\Omega} = \frac{4}{5}\,k\Omega = 0.8\,k\Omega$



$V_{Req} = I R_{eq} = 50\times10^{-3}\,A \cdot 0.8\times10^{3}\,\Omega = 40V$ across equivalent resistor

$P = \frac{(40)^2}{4k\Omega} = 0.4\,W$

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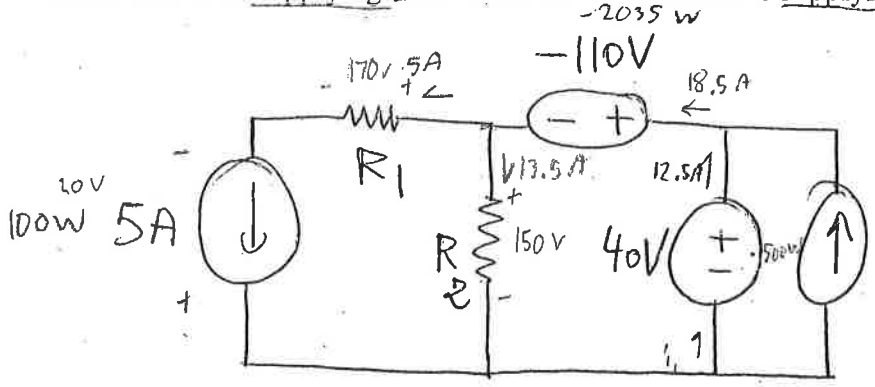
III. (30 pts) Find the values of the resistors R_1 and R_2 in the circuit below if the 5A current source is supplying 100 W and the 40 V source is supplying 500 W.



$V_{R_1} - 150V - 20V = 0$

$V_{R_1} = 170V$ $\quad 170V/5A = 34\Omega$

$R_1 = \frac{V_{R_1}}{I}$ $\quad R_2 = \frac{150V}{13.5A} = 11.11\Omega$

$P_{R_2} = 13.5^2 \cdot 11.11\Omega = 2025W$

$R = \frac{17\Omega}{5A} = 34\Omega$

$P_{R_1} = 850$

$P = iV$

$500W = i_1 \cdot 40V$

$i_1 = 12.5A$

$P = iV$

$P = 18.5A \cdot (-110V) = -2035W$

$V_{R_2} - 40V - 110V = 0$

$V_{R_2} = 150V$

$R_2 = \frac{V_{R_2}}{I} = \frac{150V}{13.5A} = 11.1\Omega$

$P = 40V \cdot 6A = 240W$

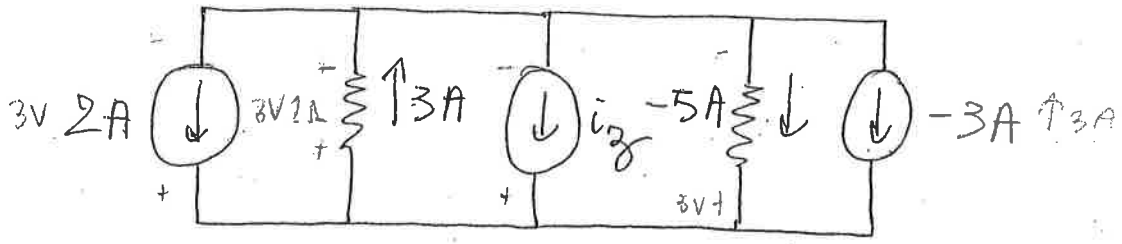
850 W
+ 2025 W
+ -500 W
+ -100 W
+ -2035 W
+ -240 W
0 W

$R_1 = 34\Omega$

$R_2 = 11.11\Omega$

30

IV. (30 pts) If the resistor carrying 3 A has a value of 1 Ω, what is the value of the resistor carrying -5 A?



$i_z + 2A + -3A + -5A + -3A = 0$

$i_z = 9A$

$1\Omega \cdot 3A = 3V$

$R = \frac{-3V}{-5A} = 0.6\Omega$

20

-6W
+9W
-27W
+15W
+9W

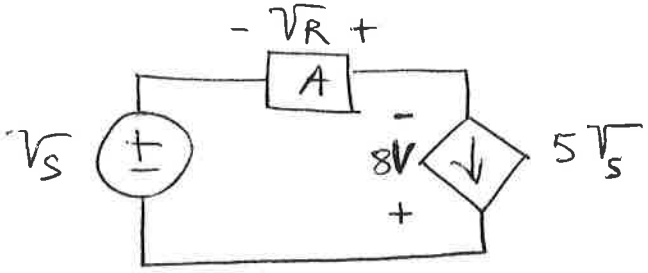
0W

Test 1 - Fall 2007 (100pts max) - M. Cahay
Name:

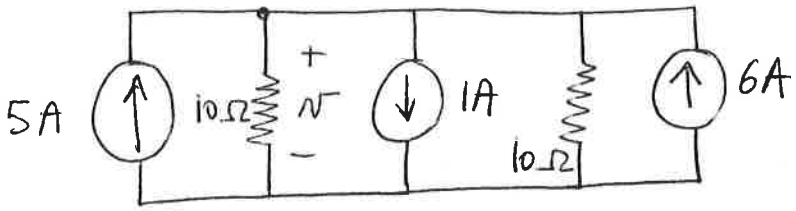
NETWORK ANALYSIS I
October 11, 2007

I. (20 pts) In the circuit below, assume V_s = 1 V and V_R = 9V and compute:

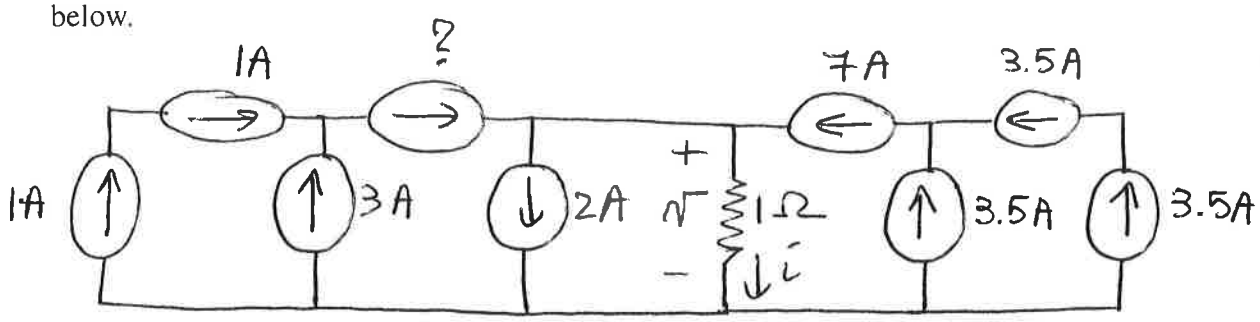
- The power absorbed by element A.
- The power supplied by each of the two sources (the voltage source on the left and the current source on the right).
- Check that the total power supplied is equal to the total power absorbed.



II. (20 pts) Determine the voltage v in the circuit below.



III. (30 pts) Using combination of sources, compute the current i in the circuit below.



IV. (30 pts) Use the supernode technique and compute the current i_1 in the circuit below.