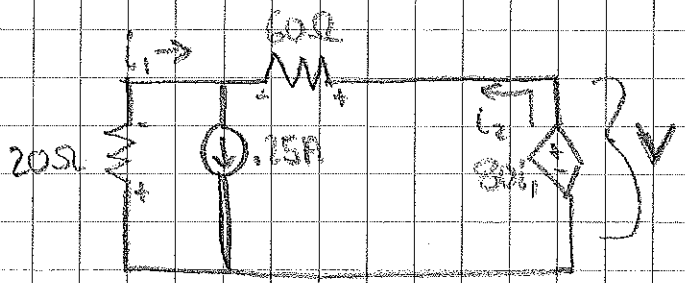
Engr. 210 - HW#2 Jared Fowler

1) Determine the value of the voltage that is measured by the meter in the circuit below:



Note: KCL → $.25A = i_1 + i_2$ (1)

KVL → $-80i_1 + 60i_2 - 20i_1 = 0$

$60i_2 = 100i_1$

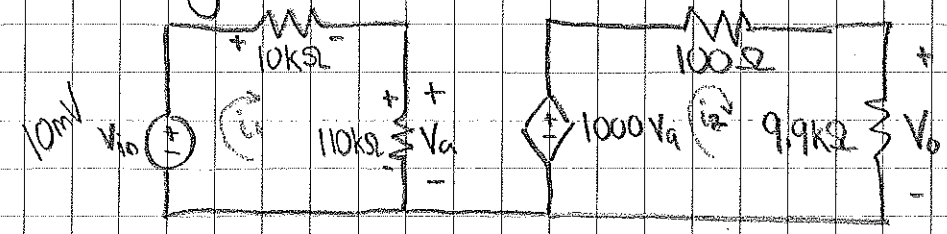
$i_1 = \frac{3}{5} i_2$ (2)

$.25 = \frac{3}{5} i_2 + i_2$ (1,2)

$.25 = \frac{8}{5} i_2$

$i_2 = .156 \rightarrow i_1 = .09375 \rightarrow V = \boxed{7.5V}$

2) The voltage input of the circuit is 10mV. Determine $V_o(t)$.



Note: KVL → $10mV = 10Ki_1 + 110Ki_1$

$10mV = 120Ki_1$

$\therefore i_1 = .0000000833A$ (1)

$\therefore V_a = i_1(110K) = 9.167mV$ (2)

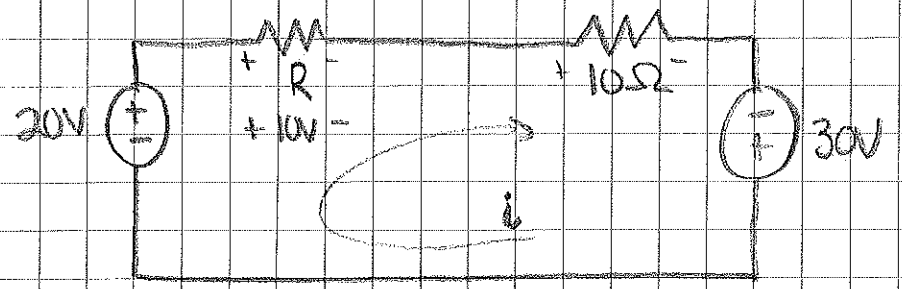
KVL → $1000(9.167mV) = 100i_2 + 9.9Ki_2$

$9.17 = 10Ki_2$

$\therefore i_2 = 0.917mA$ (3)

$V_o = (i_2)(9.9K) = (0.917)(9.9) = \boxed{9.075V}$

3) Find R in the circuit below:



Note: KVL → $-20V + 10V + 10i - 30V = 0$ (1)

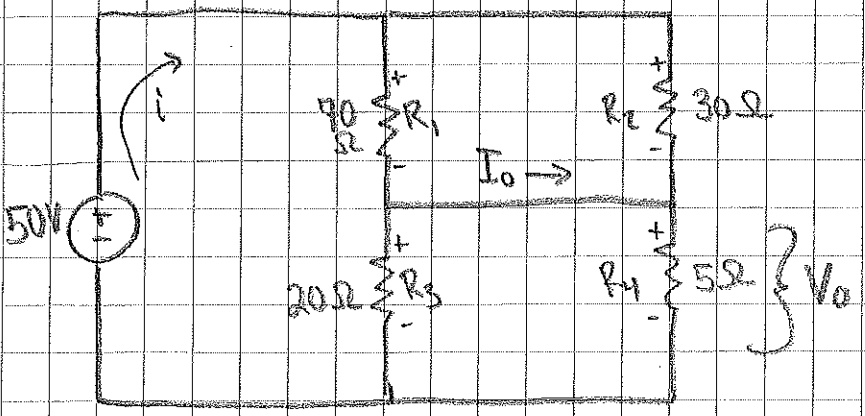
$10i = 40V$

$i = 4A$

Ohm's → $R = \frac{V_R}{i}$ (2)

$\therefore R = \frac{V_R}{i} = \frac{10}{4} = \boxed{2.5\Omega}$

4) Calculate V_o and I_o in the circuit below:



Note: $V_{R_1,R_2} \rightarrow R_{12} = \left(\frac{1}{70} + \frac{1}{30}\right)^{-1} = 21\Omega$ (1)

$V_{R_3,R_4} \rightarrow R_{34} = \left(\frac{1}{20} + \frac{1}{5}\right)^{-1} = 4\Omega$ (2)

KVL → $50V = 21i + 4i \rightarrow i = \frac{2A}{} \rightarrow V_o = V_{34} = (4)(2) = \boxed{8V}$ (3)

b/c $V_o = 8V$, this means that $i_3 = \frac{8}{20} = \frac{2}{5}$, (4)

and using KVL $50 = V_{12} + 8 \rightarrow V_{12} = 42V \rightarrow i_1 = \frac{42}{70} = \frac{3}{5}$ (5)

KCL → $i_1 = I_o + i_3 \rightarrow \frac{3}{5} = I_o + \frac{2}{5} \rightarrow I_o = \boxed{0.2A}$