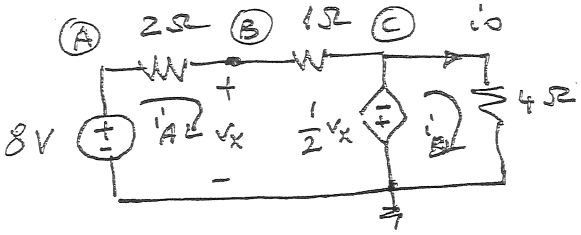
Ömer Morgül, F. Ömer İlday NAME FAMILYNAME SECTION

EEE 202 CIRCUIT THEORY
First Midterm, Spring 2014-15

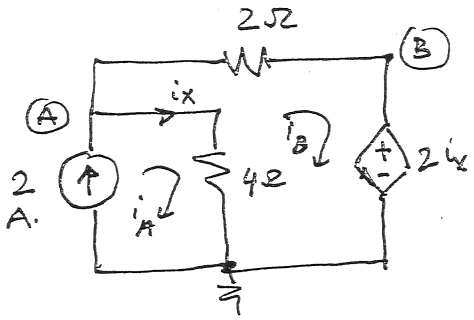
No credits will be given for unjustified answers. Good luck.

Prob. 1 : (25 pt.s)

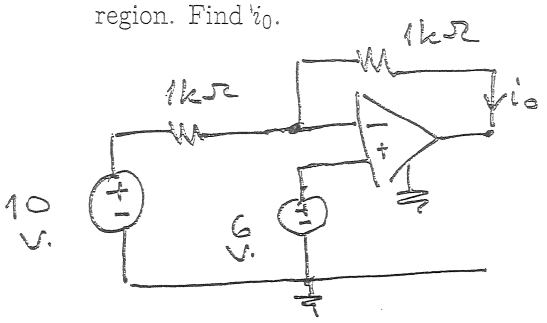
i : (5 pt.s) Find the current i_0 in the following circuit. (If you use node and/or mesh equations, use the notation indicated in the figure).



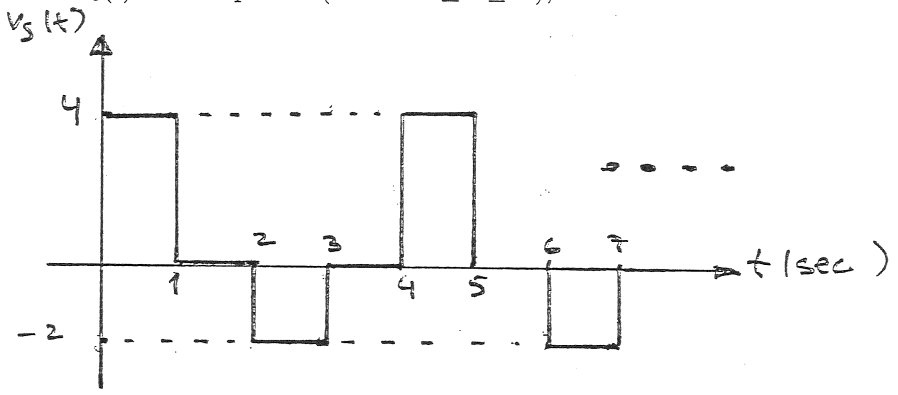
ii : (5 pt.s) Find the current i_x in the following circuit. (If you use node and/or mesh equations, use the notation indicated in the figure).



iii : (5 pt.s) Consider the following circuit. Assume that op-amp is ideal and operates in the linear region. Find i_0.

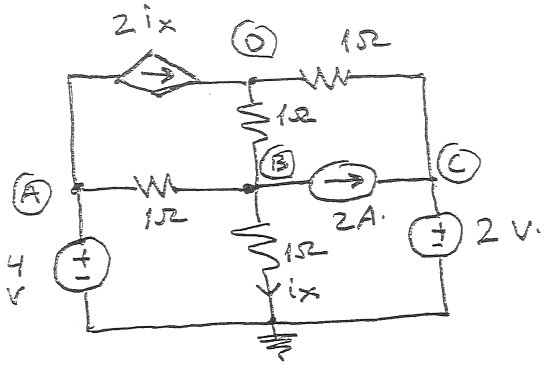


iv : (10 pt.s) Consider the periodic waveform $v_s(t)$ given below. Find its period T, average value V_{avg} and rms value V_{rms} of this signal. Also let $v_0(t)$ be defined as $v_0(t) = \int_0^t v_s(\tau)d\tau$. Find and sketch $v_0(t)$ for one period (i.e. for $0 \leq t \leq T$), and indicate the relevant values in the sketch.

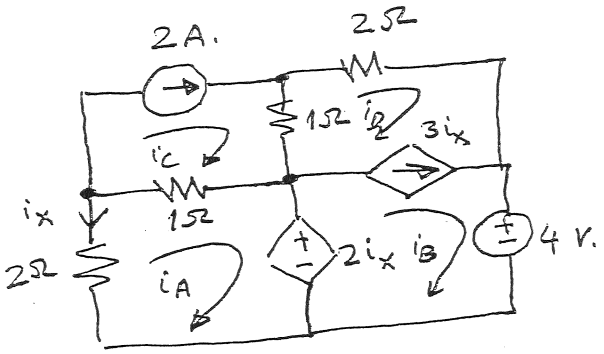


Prob. 2 : (25 pt.s)

i : (12 pt.s) Consider the following circuit. By using **NODE** analysis, find the node voltages. (Use the notation indicated in the figure).

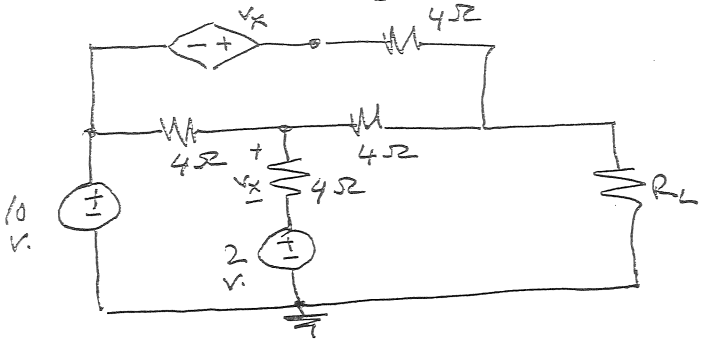


i : (13 pt.s) Consider the following circuit. By using **MESH** analysis, find the mesh currents. (Use the notation indicated in the figure).

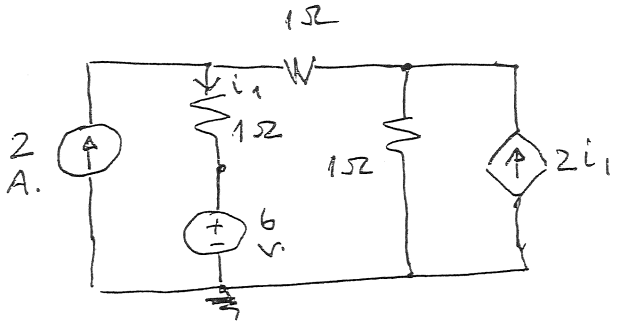


Prob. 3 : (25 pt.s)

i : (13 pt.s) Consider the following circuit. Here, R_L is an unknown resistance to be determined. Find the value of R_L so that the power transferred to it is maximum. In this case, find the maximum power delivered to R_L.



ii : Consider the following circuit. By using **SUPERPOSITION**, find i_1.



Prob. 4 : (25 pt.s) Consider the following circuit. Assume that all op-amps are ideal and operate in linear region. Let $R_s = 1\ k\Omega$. Find v_0, v_1, v_2, i_s, i_1 and i_f as functions of v_s for :

i : $R_f = \infty$.

ii : $R_f = 40\ k\Omega$.