Name : Solution Section:_____ CWRU e-mail:_____

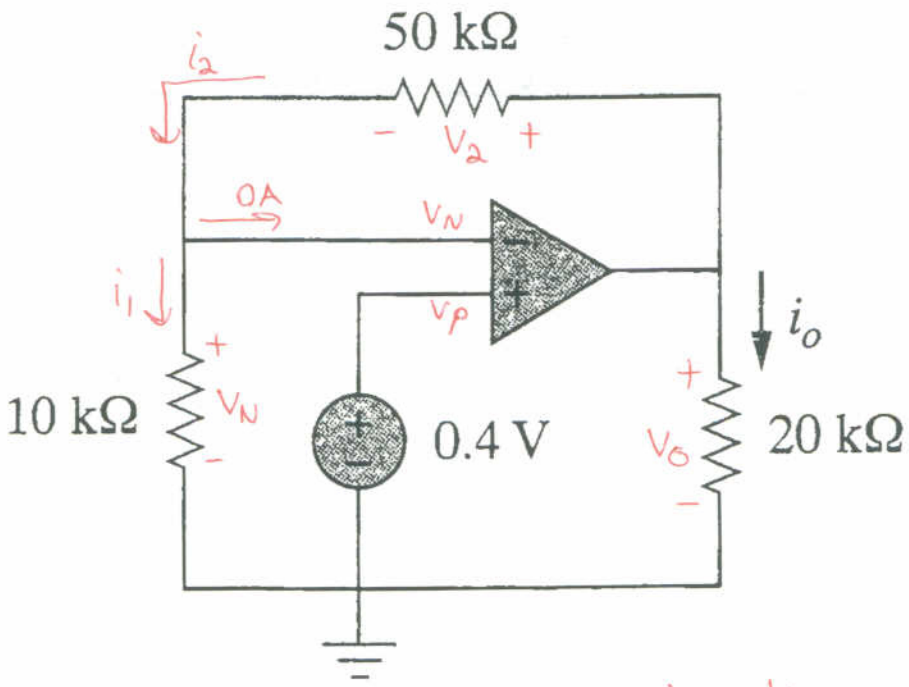
CASE WESTERN RESERVE UNIVERSITY
Case School of Engineering
Department of Electrical Engineering and Computer Science
ENGR 210. Introduction to Circuits and Instruments (4)

Quiz No. 7 **3/4/05**

PUT ANSWERS IN THE SPACE PROVIDED AND, IF APPROPRIATE, SHOW YOUR WORK. BE SURE TO STATE ANY ASSUMPTIONS

Problem 1 (10 points)

Determine i_o in the circuit below. i_o= 0.12mA → point structure below



(3) $V_N = V_P = 0.4V$

(3) $i_2 = i_1 = \frac{0.4V}{10k\Omega} = 0.04mA$

$V_2 = i_2(50k\Omega) = 2V$

$i_o = \frac{V_o}{20k\Omega}$

$V_o = V_1 + V_2 = 2.4V$ (3)

$i_o = \frac{2.4V}{20k\Omega}$

$\boxed{i_o = 0.12mA}$ — (1)

* Note, you did not have to show all the work above, but you had to show some work beyond the answer

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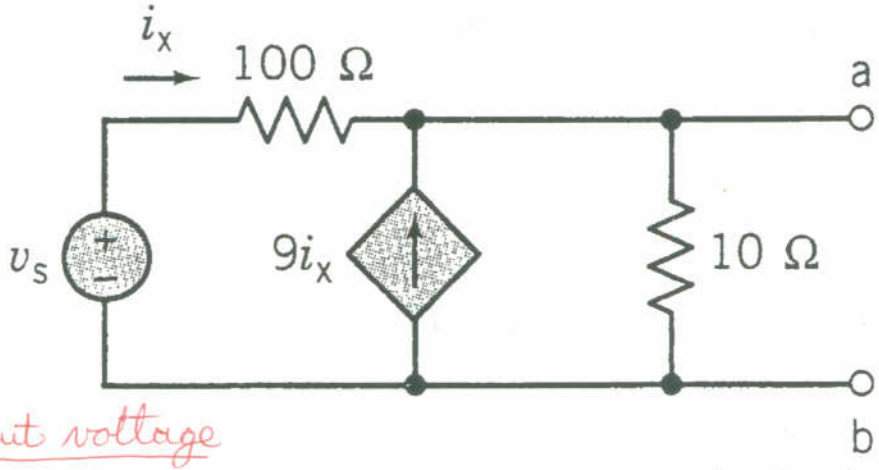
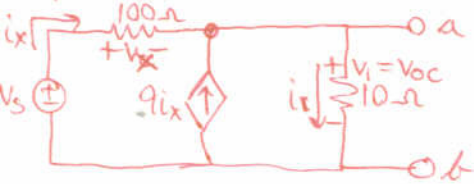
Problem 2 (10 points)

Determine the Thevenin equivalent circuit for the circuit shown below at the output terminals a-b.



open circuit voltage



5 — ④ – method
① – answer

$V_{oc} = i_1(10\Omega)$

$i_1 = i_x + 9i_x = 10i_x$

$i_x = \frac{V_x}{100\Omega}$

$V_x = V_s - V_{oc}$

$i_x = \frac{V_s}{100\Omega} - \frac{V_{oc}}{100\Omega}$

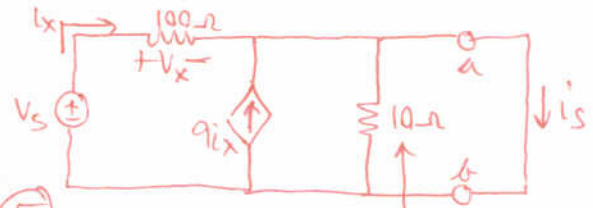
$i_1 = \frac{V_s}{10\Omega} - \frac{V_{oc}}{10\Omega}$

$V_{oc} = V_s - V_{oc}$

$2V_{oc} = V_s$

$V_{oc} = \frac{1}{2}V_s$

short circuit current



same as above — 5

Note: in parallel w/ short, no current through 10Ω resistor

$i_{sc} = i_x + 9i_x - 0$

$= 10i_x$

$i_x = \frac{V_x}{100}$

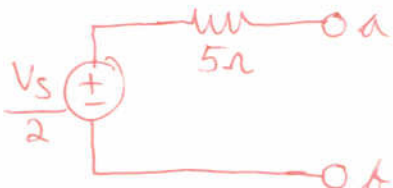
$V_x = V_s - 0$

$i_x = \frac{V_s}{100\Omega}$

$i_{sc} = \frac{V_s}{10\Omega}$

$R_T = \frac{V_{oc}}{I_{sc}} = \frac{V_s/2}{V_s/10\Omega} = 5\Omega$

$R_T = 5\Omega$



* Note – equivalent R (can NOT look-back on a dependent source!)