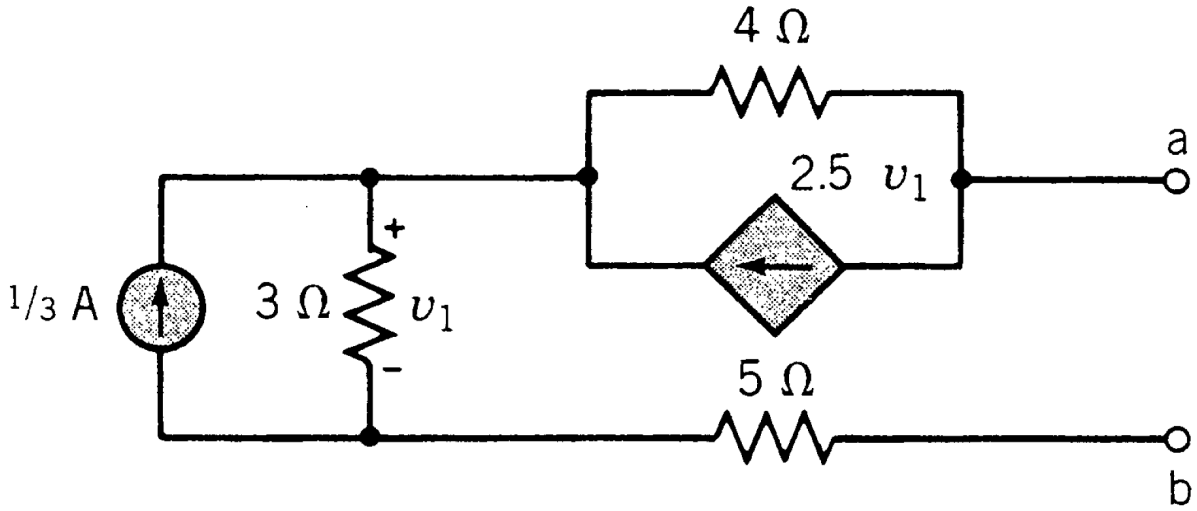
CASE WESTERN RESERVE UNIVERSITY
Case School of Engineering
Department of Electrical Engineering and Computer Science
ENGR 210. Introduction to Circuits and Instruments (4)

Homework Set No. 7 Issued 2/23/05
References: [T&R4] sections 4-1, 4-2,4-4 Due 3/2/05

EQUIVALENT CIRCUITS WITH LINEAR DEPENDENT SOURCES

1) (5 pts) Norton equivalent with active sources.

Find the Norton equivalent circuit with respect to the terminals a,b for the circuit below.

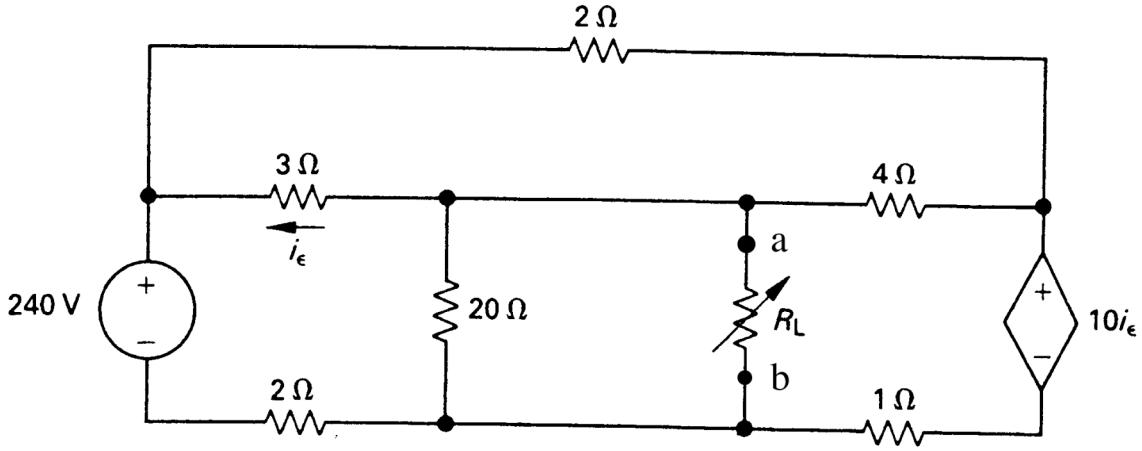


2) (5 pts) Thevenin equivalent with active sources, maximum power transfer.

(a) Find the Thevenin equivalent of this circuit with respect to terminals a-b, i.e., if you remove R_L what is the Thevenin equivalent of this circuit at a-b?

(b) The variable resistor (R_L) in the circuit below is adjusted for maximum power transfer to R_L. What is the numerical value of R_L?

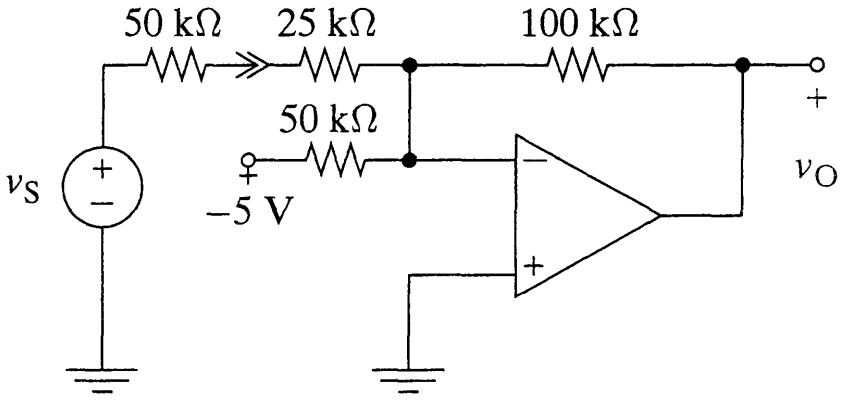
(c) What is the maximum power in watts that can be transferred to R_L?



BASIC OP-AMP CIRCUITS

3) (5 pts) Inverting amplifier.

Find v_o in terms of v_s in the circuit below.

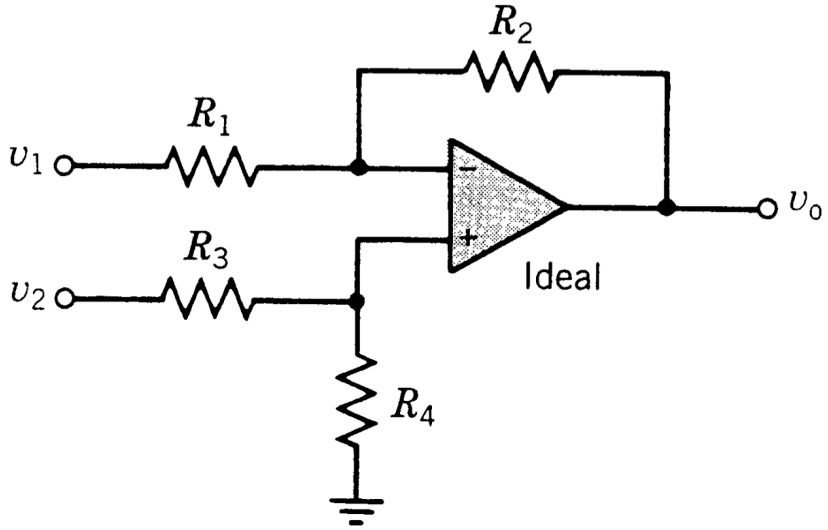


4) (5 pts) Difference amplifier

The circuit below is a voltage-subtracting circuit.

(a) Show that v_o can be expressed as $v_o = \dfrac{1+\dfrac{R_2}{R_1}}{1+\dfrac{R_3}{R_4}} v_2 - \dfrac{R_2}{R_1} v_1$

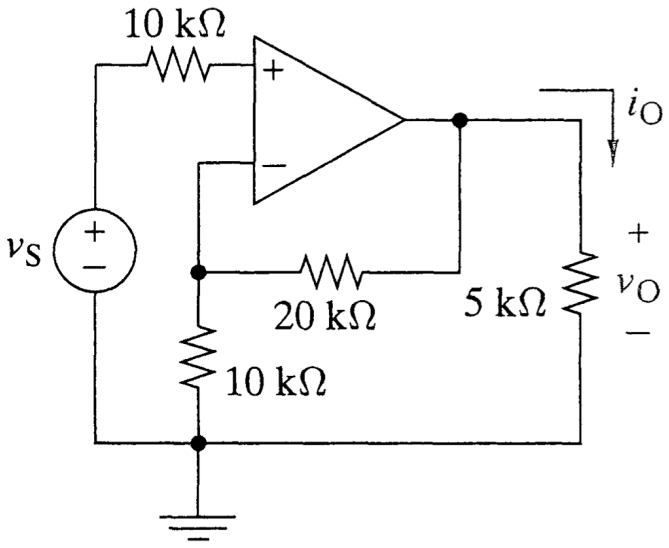
(b) Design a circuit to give an output $v_o=4v_2-11v_1$.



5) (5 pts) Non-inverting amplifier

(a) Find v_o in terms of v_s.

(b) Find i_o for v_s=1.5 volts.



NOTE: Please put section code AND your CWRU e-mail next to name at top of page. Section codes are

MA (Monday Afternoon)
ME (Monday Evening)
TA (Tuesday Afternoon)
TE (Tuesday Evening)
WA (Wednesday Afternoon)
WE (Wednesday Evening)