EECS 105 – Microelectronic Devices and Circuits

Spring 2001, Prof. A. R. Neureuther
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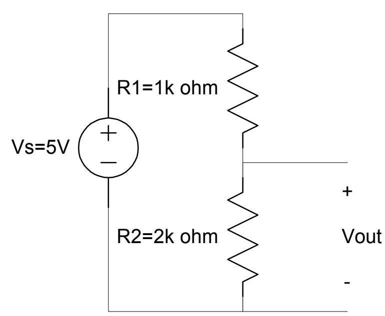
Course Web Site http://www-inst.EECS.Berkeley.EDU/~ee105/

Homework Assignment # 1, Due January 26, 2001

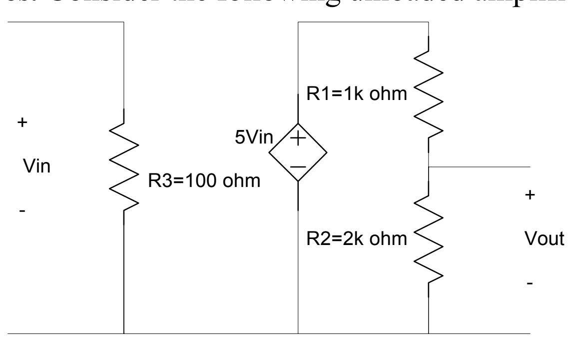
Announcements for Week of January 16-19 see web for full details:
Discussion: Sections will meet and review material from EE40
Laboratories: Will not meet this week. Purchase an inexpensive laboratory notebook (such as a Mead Composition book ~$2.00) and number about 30 pages. Also procure a floppy disk to carry just incase the printer is not working.
Textbooks: Copies of the Howe and Sodini texts are available at ASUC (36) and Ned's Berkeley Bookstore (30).
Reading: H&S Chapter 1, (emphasis on circuits rather than physics), 8.4 (idealized current source), 8.2.2, 9.1 (just use of dependent sources in block stages and gain)

1.1) **Fundamental equivalents.** Consider the following circuit:



a) Find the Thevinin equivalent circuit.
b) Find the Norton equivalent circuit.

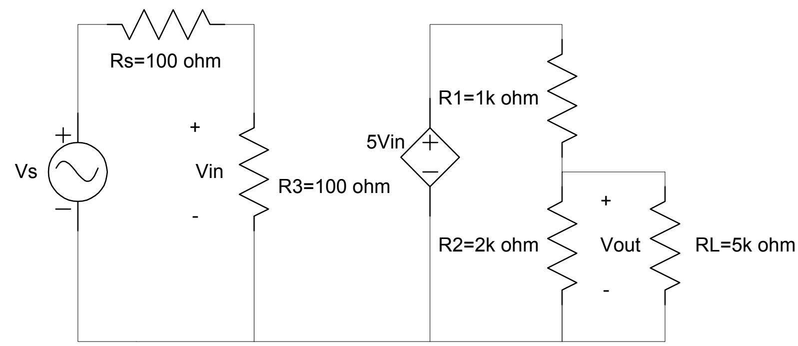
1.2) **Dependent sources.** Consider the following unloaded amplifier circuit:



a) Find the open circuit voltage gain, Vout/Vin, of this amplifier.

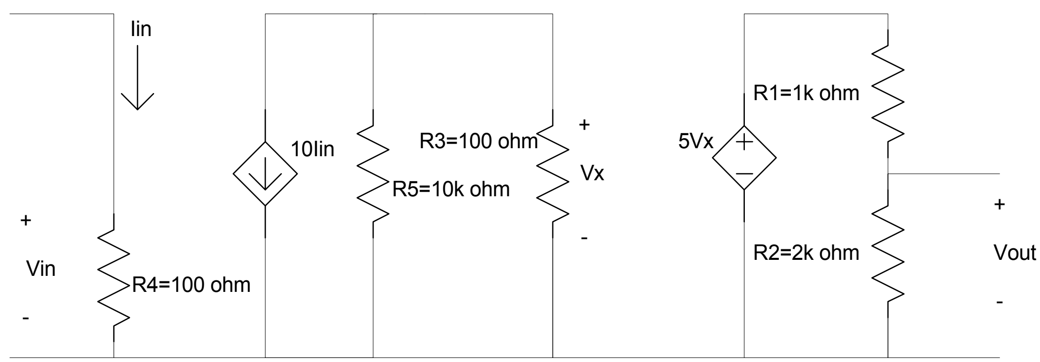
b) Find Rout, the resistance an ohm-meter would measure between the two output nodes.
c) Find Rin, the resistance an ohm-meter would measure between the two input nodes.
d) Draw the standard two-port voltage amplifier that is equivalent to the above circuit.

1.3) **Sources and loads.** Consider the following loaded amplifier circuit with a non-ideal source.



a) Find the overall gain of this amplifier, Vout/Vs, and write it in a form so that it is factored into three terms: input voltage divider, open circuit voltage gain, and output voltage divider. Hint: substituting the simplified two-port from part 1.2d into this circuit will make this problem easier.

1.4) **Cascaded amplifiers.** Consider the following pair of cascaded amplifier circuits:



a) Draw the single standard two-port voltage amplifier that is equivalent to the above pair of amplifiers.