EE100 Spring 2005 Midterm II Review Problems

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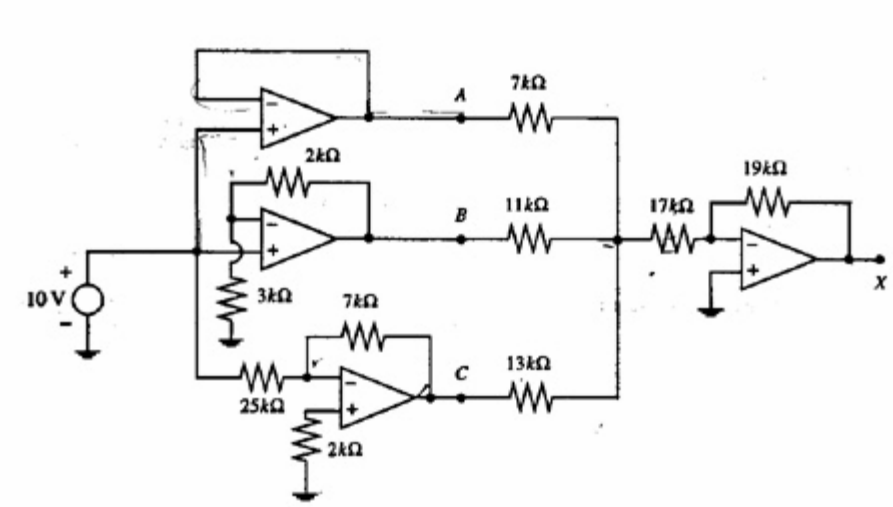
Note(s):

1. These problems have been recycled from old EE40 midterm/final problems. The answers to these problems may not be whole numbers (unlike your actual midterm). However they will hopefully drill the concepts into your head.
2. The midterm is on Thursday, April 14th 2005.

Problem 1



In the above circuit all the op-amps are "ideal".

a) Find Va (the voltage at node A with respect to ground):

b) Find Vb:

c) Find Vc:

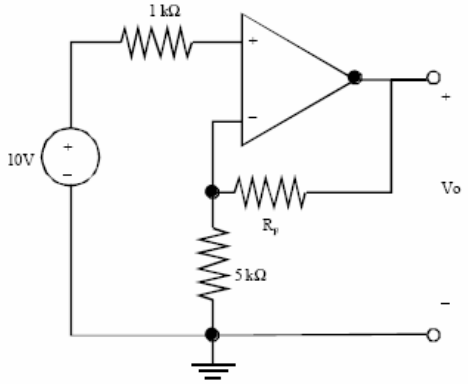
d) Find Vd:

Please note: In the question above, do not worry about rail voltages (that's what 'all the op-amps are "ideal"' refers to).

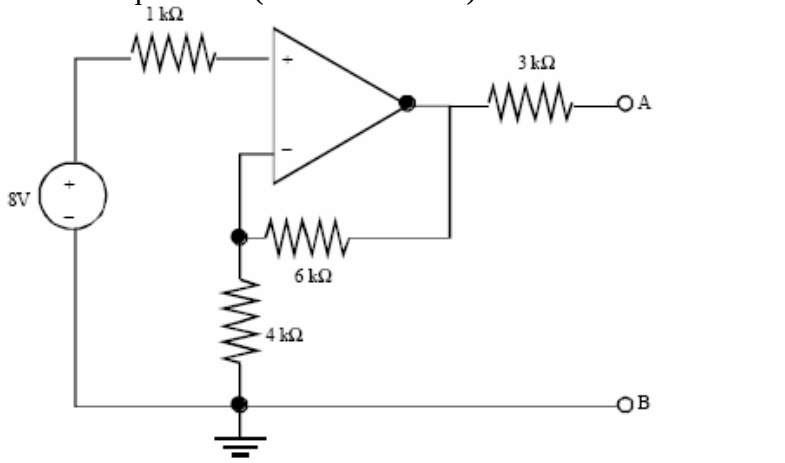
Problem 2

Assume the op-amps below have a saturation voltage of +16 V and -16 V. **DO NOT IGNORE THE EFFECTS OF THE RAIL VOLTAGES!**

(a) For what values of R_F will the op-amp be saturated?



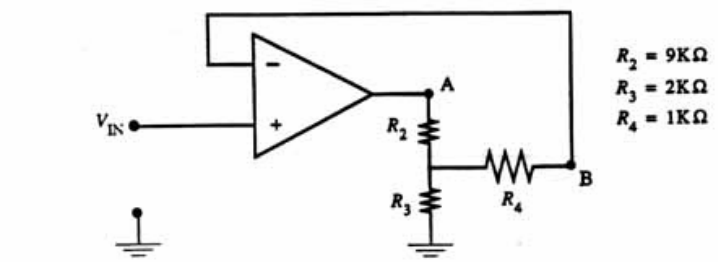
(b) Find the Thevenin equivalent (at terminals AB) of the circuit below



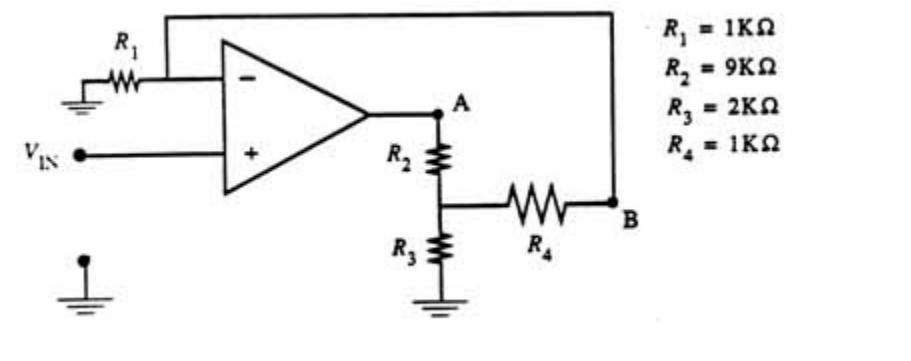
Problem 3

Ignoring the effects of the rail voltages for the op-amps below, find V_A and V_B in terms of V_{in}.

(a)



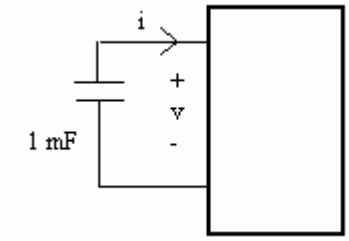
(b)

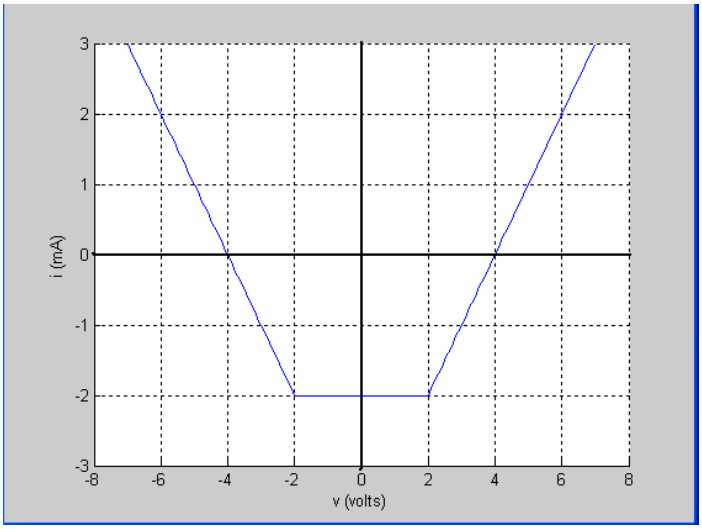


Problem 4: Work on problem 5.36 from your textbook (on page 212).

Problem 5: Work on problem 5.47 from your textbook (on page 214).

Problem 6

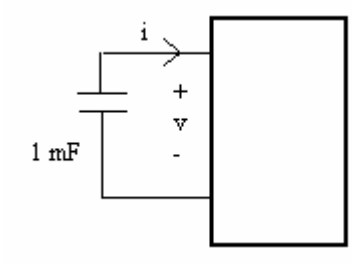


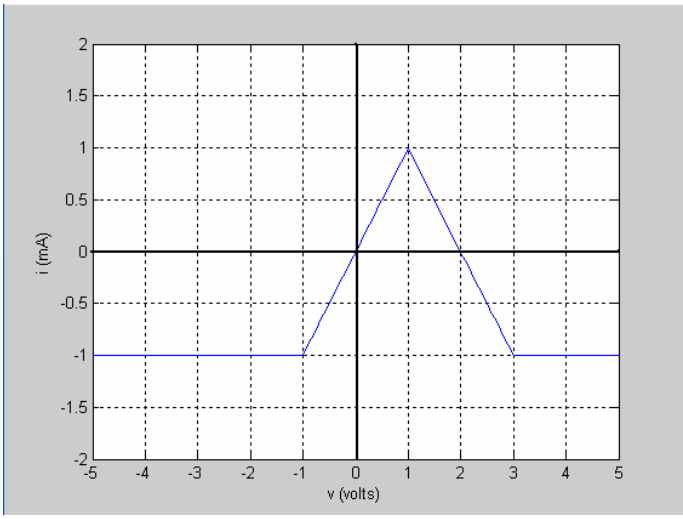


The i-v graph of the nonlinear circuit element is shown in the figure above. Assuming v(0) = 0 V:

(a) Find the equilibrium points and sketch the dynamic route.
(b) Sketch i(t) and v(t), make sure to mark the switching times on the graph(s).

Problem 7





The i-v graph of the nonlinear circuit element is shown in the figure above. Assuming i(0) = 0.5 mA:

(c) Find the equilibrium points and sketch the dynamic route.
(d) Sketch i(t) and v(t), make sure to mark the switching times on the graph(s). (**Hint: for the unstable part, think carefully about the final values of i and v).**

You should look over the flip-flop example from Lecture 20 on the EE100 homepage. **MAKE SURE YOU UNDERSTAND THIS PROBLEM FOR THE MIDTERM!** Of course, you could surf http://hkn.eecs.berkeley.edu/student/onlineexams.shtml for online exams from EE40 and EE100, but many of these problems are way too difficult and confusing for your midterm.