Duke University
Edmund T. Pratt, Jr. School of Engineering

EE 61 Section 2, Spring 2001

Test II

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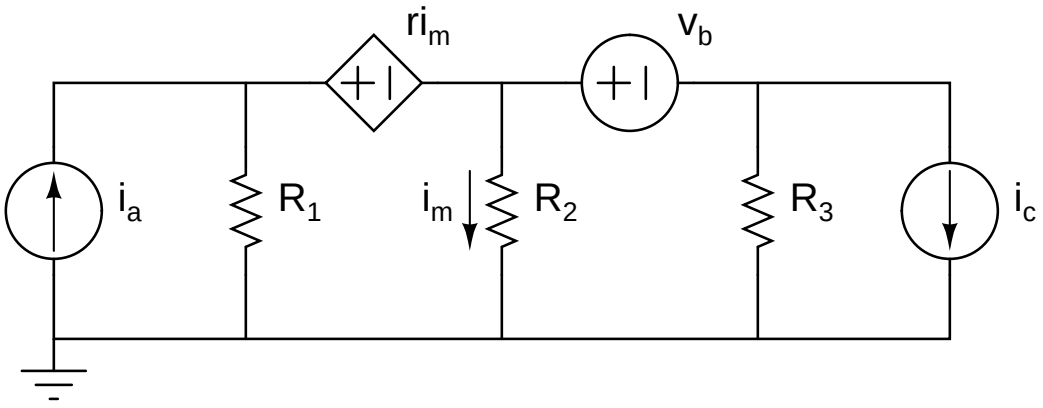
Name (please print)_____

In keeping with the Honor Code, I have neither provided nor received any assistance on this test. I understand if it is later determined that I gave or received assistance, I will fail the class and will be brought before the Undergraduate Judicial Board.

Signature:_____

Problem I: [20 pts.] Superposition

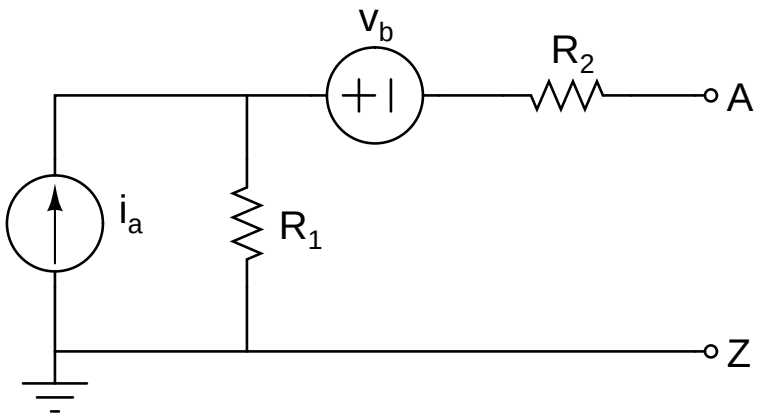
Given the following circuit:



and known values i_a, v_b, i_c, r, R_1, R_2, and R_3, find i_m using superposition. You *must* redraw the circuit each time to get full credit for this problem.

Problem II: [15 pts.] Thévenin-Norton I

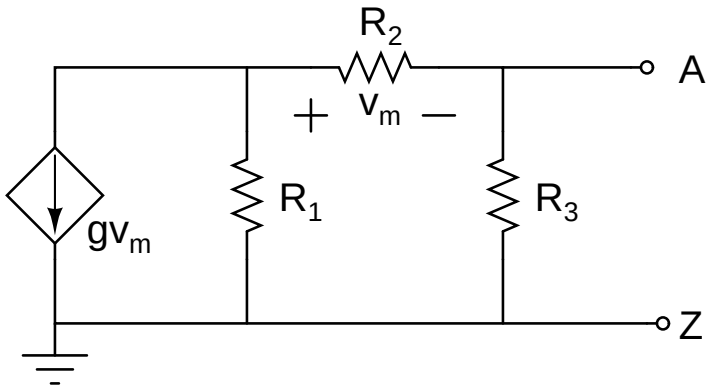
Given the following circuit:



and known values i_a, v_b, R_1, and R_2, determine *and draw* both the Thévenin and Norton equivalent circuits as seen at terminals AZ.

Problem III: [20 pts.] Thévenin-Norton II

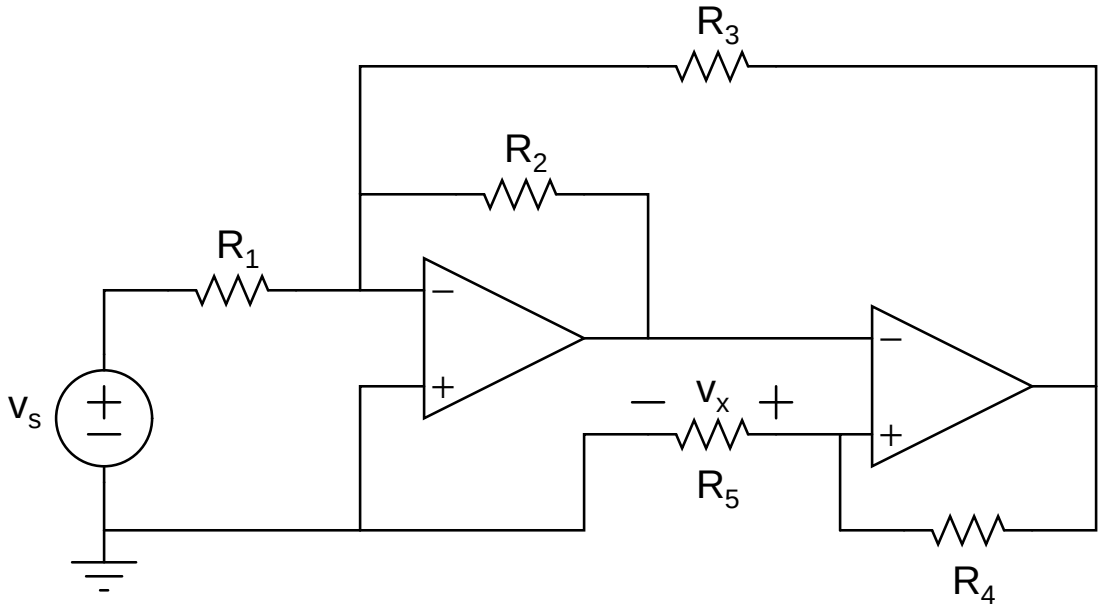
Given the following circuit:



and known values g, R_1, R_2, and R_3, determine *and draw* the Thévenin equivalent circuit as seen at terminals AZ.

Problem IV: [20 pts.] Operational Amplifiers

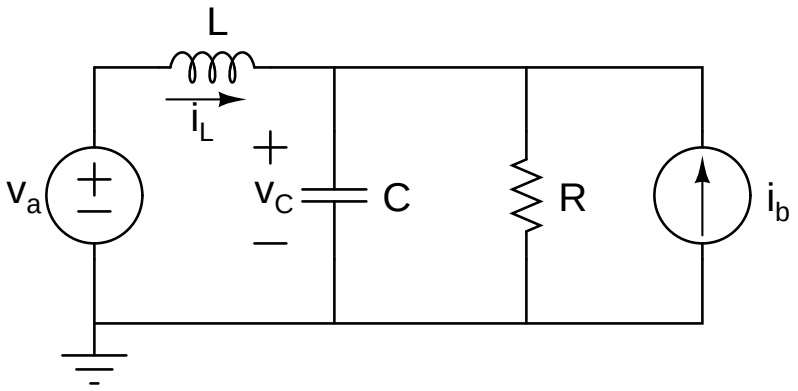
Given the following circuit:



and known values v_s, R_1, R_2, R_3, R_4, and R_5, find v_x in terms of the known values. You may assume both operational amplifiers are ideal.

Problem V: [25 pts.] Inductors and Capacitors

Given the following circuit:



and known values v_a, i_b, R, L, and C,

(1) find a differential equation for v_C in terms of the known values. If done correctly, you will end up with a *second* order differential equation. *Hint: use v_C and i_L as your only unknowns to develop two equations for the circuit, then substitute one into the other to get a single equation with v_C and its derivatives.*

(2) Assume that v_a and i_b are constant and that this circuit has been in place for a very long time. Determine the capacitor voltage v_C and inductor current i_L in terms of the known values.