EECS 16A Designing Information Devices and Systems I
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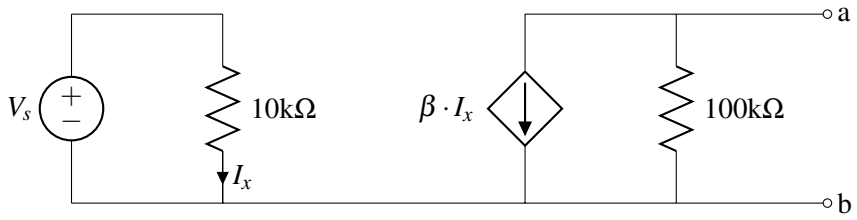
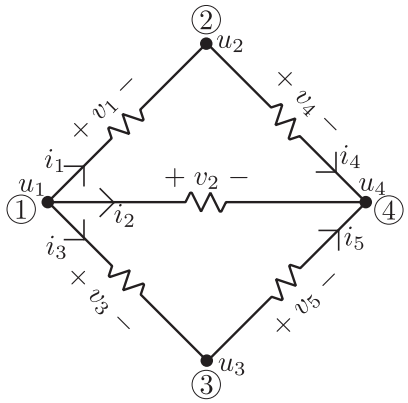
Discussion 6B

1. Equivalence Find the Thévenin and Norton equivalents of the following circuit across the terminals a and b (in terms of V_s and β). Note that the current source is dependent on the current I_x.



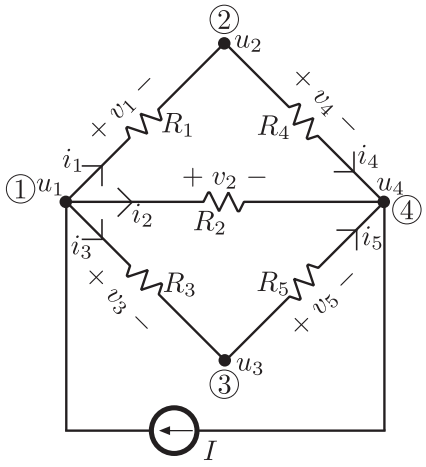
2. Kirchhoff's Current Law and Kirchhoff's Voltage Law

(a) Write Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) for the following circuit. Represent them as matrix-vector multiplications.



(b) Write Ohm's law for all resistors in matrix form.

(c) The following circuit shows the arrangement of resistors with a current source connected between nodes 1 and 4. Using the values for the resistors $R_1 = R_3 = R_4 = R_5 = 1\Omega$, $R_2 = 2\Omega$, and $I = 3A$, setup a system of equations (in matrix form) to find the currents i_1, i_2, i_3, i_4, i_5 and voltages v_1, v_2, v_3, v_4.



(d) Solve for the currents and voltages in Figure 2 by inspection (using effective series/parallel resistors).

3. Switch In the following circuit, the output voltage v_o is either 26 V or 24 V, depending on whether the switch is open or closed. For which state is v_o = 24 V? Find R_2 and R_3.