UNIVERSITY OF CALIFORNIA
College of Engineering
Department of Electrical Engineering
and Computer Sciences

B. E. BOSER | **Problem Set 4** | **EE 42 / 100**
Due Tuesday, February 19, 2008 | **Spring 2008**

In problems you are asked to verify your result with a circuit simulator. Please follow the guidelines presented in Problem Set 3 which apply to this and all future homework sets.

1. Solve problem 2 of quiz 2 for $I_1 = 3\,\text{A}$. Use the values stated in the quiz for elements not specified here.

2. Quiz 2, problem 4: Find the value of I_3 for $V_1 = 5\,\text{V}$.

3. Quiz 2, problem 7: Find the value of R_{eq} for $R_2 = 10\,\text{k}\Omega$.

4. Quiz 2, problem 7: Find the value of R_3 for $R_{\text{eq}} = 5\,\text{k}\Omega$, $R_1 = 1\,\text{k}\Omega$, and $R_2 = 10\,\text{k}\Omega$.

5. Quiz 2, problem 9: Find the power dissipated in R_2.

6. Problem 4.6 in Nilsson and Riedel, 8^{th} edition

7. Problem 4.15 and verify your solution with circuit simulation. The simulator output (operating point analysis) should include a list of all node voltages and branch currents.
   Suggestion: Use a program (e.g. Matlab) to solve the equations numerically.

8. Problem 4.21 and verify your result with circuit simulation

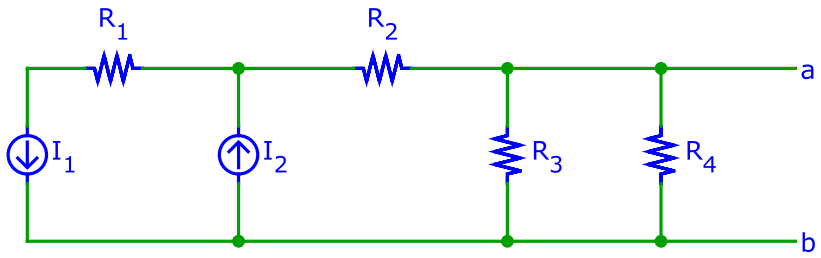
9. Suggestion only: do the assessment problems on page 123 in Nilsson and Riedel, 8^{th} edition

10. Draw the Thévenin and Norton equivalent circuits for the circuit shown in Figure P4.65 (in Nilsson and Riedel, 8^{th} edition) and calculate the values of the circuit elements.

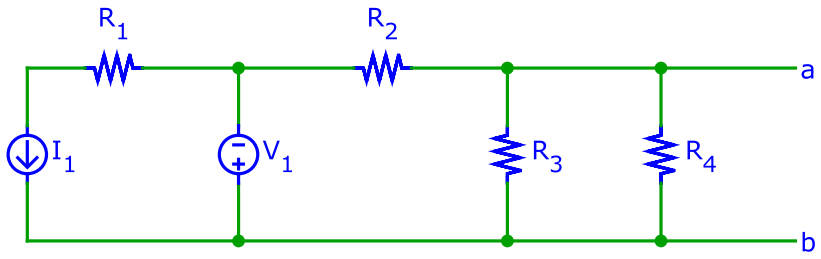
11. Problem 4.68

12. Problem 4.69

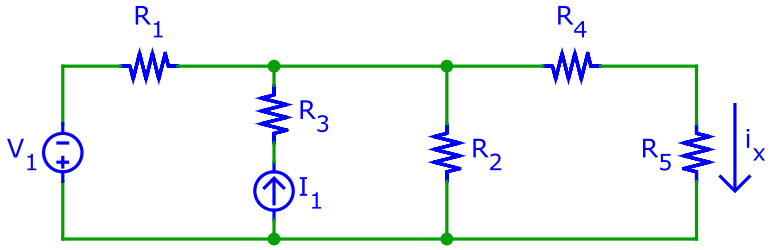
13. Find algebraic expressions for the circuit elements of a Norton equivalent circuit representing the behavior at terminals a-b of the circuit shown below.



14. Find algebraic expressions for the circuit elements of a Thévenin equivalent circuit representing the behavior at terminals a-b of the circuit shown below.



15. Find an algebraic expression for i_x. Simplify your result as much as possible (e.g. no fractions of fractions).



16. Assume that the operational amplifier in the circuit below is ideal.
    (a) Find an expression for voltage v_x.
    (b) Find an algebraic expression for the value of the voltage gain, $\frac{v_o}{v_i}$. Simplify your result as much as possible (e.g. no fractions of fractions).