P2.101. **a.** The Wheatstone bridge shown in Figure 2.64 is balanced with $R_1 = 10\ \text{k}\Omega$, $R_3 = 3419\ \Omega$, and $R_2 = 1\ \text{k}\Omega$. Find R_x. **b.** Repeat if R_2 is $100\ \text{k}\Omega$ and the other values are unchanged.

***P2.102.** The Wheatstone bridge shown in Figure 2.64 has $v_s = 10$ V, $R_1 = 10\ \text{k}\Omega$, $R_2 = 10\ \text{k}\Omega$, and $R_x = 5932\ \Omega$. The detector can be modeled as a 5-kΩ resistance. **a.** What value of R_3 is required to balance the bridge? **b.** Suppose that R_3 is $1\ \Omega$ higher than the value found in part (a). Find the current through the detector. (*Hint:* Find the Thévenin equivalent for the circuit with the detector removed. Then, place the detector across the Thévenin equivalent and solve for the current.) Comment.

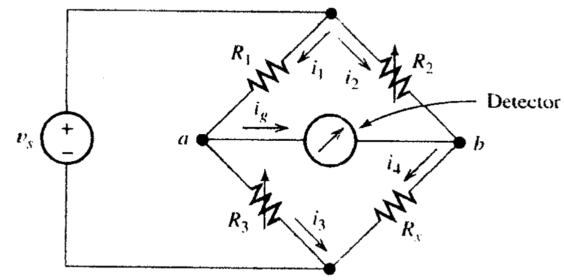

Figure 2.64 The Wheatstone bridge. When the Wheatstone bridge is balanced, $i_g = 0$ and $v_{ab} = 0$.

P4.3. The initial voltage across the capacitor shown in Figure P4.3 is $v_C(0+) = 0$. Find an expression for the voltage across the capacitor as a function of time, and sketch to scale versus time.

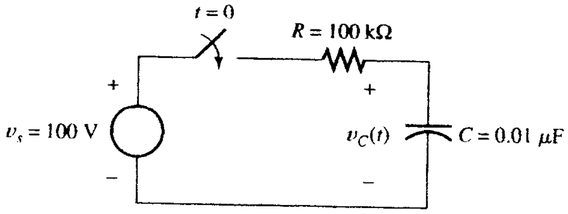

Figure P4.3

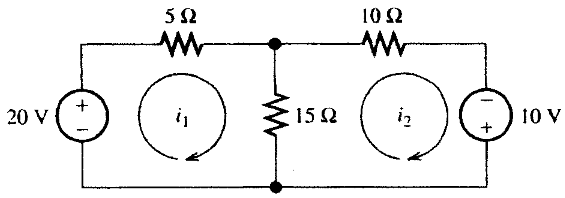

Figure P2.61

P2.62. Solve for the power delivered by the voltage source in Figure P2.62, using the mesh-current method.

***P2.89.** Use superposition to find the current i in Figure P2.89. First, zero the current source and find the value i_v caused by the voltage source alone. Then, zero the voltage source and find the value i_c caused by the current source alone. Finally, add the results algebraically.

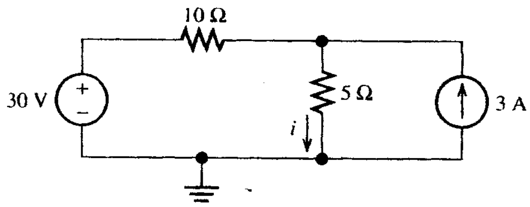

Figure P2.89