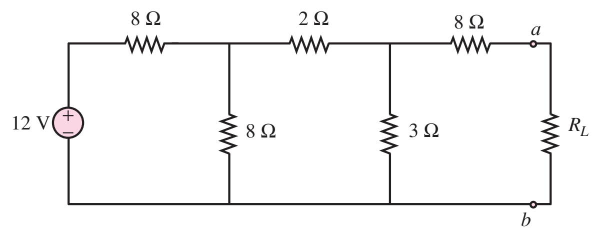

Figure P3.57

3.58 Find the Thévenin equivalent of the circuit connected to R_L in Figure P3.58, where $R_1 = 10\ \Omega$, $R_2 = 20\ \Omega$, $R_g = 0.1\ \Omega$, and $R_p = 1\ \Omega$.

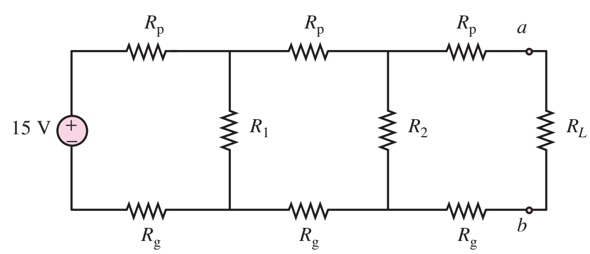

Figure P3.58

3.59 The Wheatstone bridge circuit shown in Figure P3.59 is used in a number of practical applications. One traditional use is in determining the value of an unknown resistor R_x.
Find the value of the voltage $V_{ab} = V_a - V_b$ in terms of R, R_x, and V_S.
If $R = 1\ \text{k}\Omega$, $V_S = 12$ V and $V_{ab} = 12$ mV, what is the value of R_x?

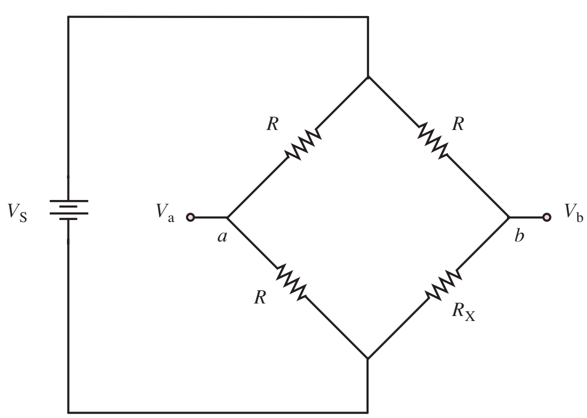

Figure P3.59

3.60 It is sometimes useful to compute a Thévenin equivalent circuit for a Wheatstone bridge. For the circuit of Figure P3.60,

a. Find the Thévenin equivalent resistance seen by the load resistor R_L.

b. If $V_S = 12$ V, $R_1 = R_2 = R_3 = 1\ \text{k}\Omega$, and R_x is the resistance found in part b of the previous problem, use the Thévenin equivalent to compute the power dissipated by R_L, if $R_L = 500\ \Omega$.

c. Find the power dissipated by the Thévenin equivalent resistance R_T with R_L included in the circuit.

d. Find the power dissipated by the bridge without the load resistor in the circuit.

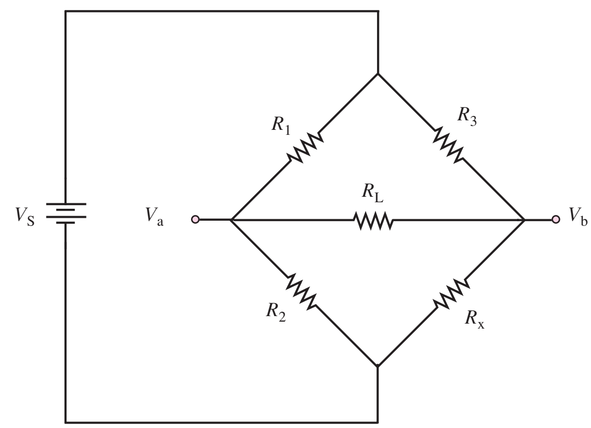

Figure P3.60

3.61 The circuit shown in Figure P3.61 is in the form of what is known as a *differential amplifier*. Find the expression for v_0 in terms of v_1 and v_2 using Thévenin's or Norton's theorem.

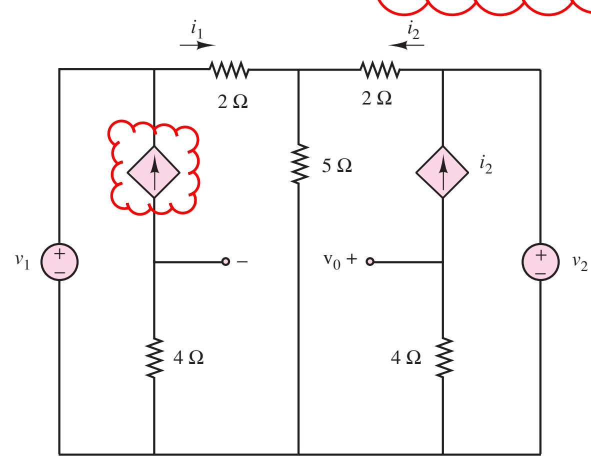

Figure P3.61

3.62 Find the Thévenin equivalent resistance seen by resistor R_3 in the circuit of Figure P3.5. Compute the