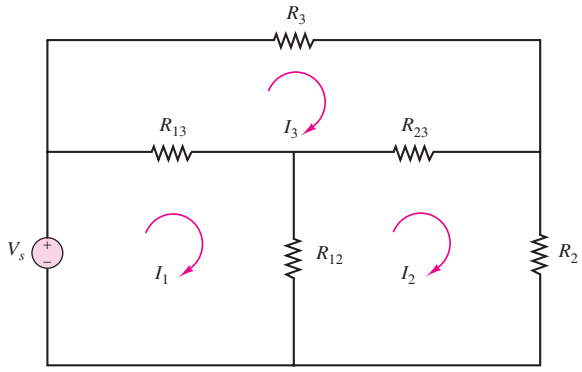

Figure P3.19

3.20 For the circuit of Figure P3.20, use mesh current analysis to find the matrices required to solve the circuit, and solve for the unknown currents. [*Hint*: you may find source transformations useful.]

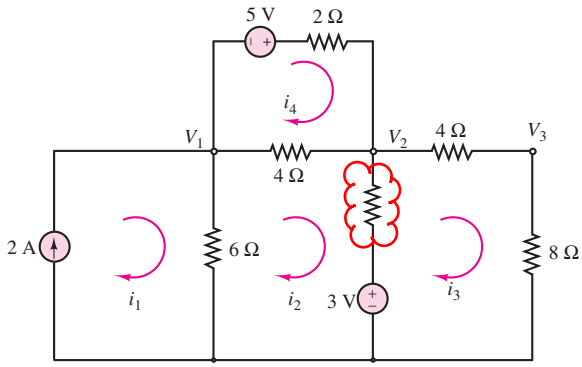

Figure P3.20

3.21 In the circuit in Figure P3.21, assume the source voltage and source current and all resistances are known.

a. Write the node equations required to determine the node voltages.

b. Write the matrix solution for each node voltage in terms of the known parameters.

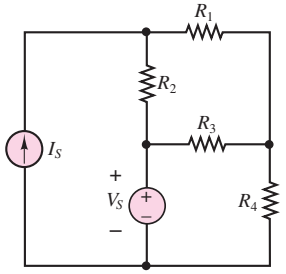

Figure P3.21

3.22 For the circuit of Figure P3.22 determine

a. The most efficient way to solve for the voltage across R_3. Prove your case.

b. The voltage across R_3.

$V_{S1} = V_{S2} = 110$ V

$R_1 = 500$ mΩ $\quad R_2 = 167$ mΩ

$R_3 = 700$ mΩ

$R_4 = 200$ mΩ $\quad R_5 = 333$ mΩ

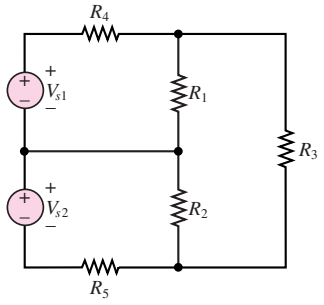

Figure P3.22

3.23 In the circuit shown in Figure P3.23, V_{S2} and R_s model a temperature sensor, i.e.,

$V_{S2} = kT \quad k = 10$ V/°C

$V_{S1} = 24$ V $\quad R_s = R_1 = 12$ kΩ

$R_2 = 3$ kΩ $\quad R_3 = 10$ kΩ

$R_4 = 24$ kΩ $\quad V_{R3} = -2.524$ V

The voltage across R_3, which is given, indicates the temperature. Determine the temperature.

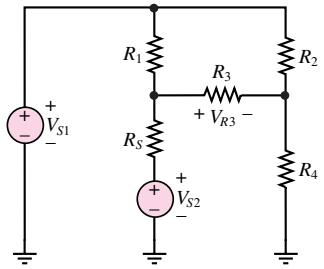

Figure P3.23

3.24 Using KCL, perform node analysis on the circuit shown in Figure P3.24, and determine the voltage across R_4. Note that one source is a controlled voltage source! Let $V_S = 5$ V; $A_V = 70$; $R_1 = 2.2$ kΩ; $R_2 = 1.8$ kΩ; $R_3 = 6.8$ kΩ; $R_4 = 220$ Ω.