Example 3.6-3 Determine the values of $i_3$, $v_4$, $i_5$ and $v_6$.

Series resistors:

\[ i = i_1 = i_2, \quad v_1 = \frac{R_1}{R_1 + R_2} v, \quad \text{and} \quad v_2 = \frac{R_2}{R_1 + R_2} v \]

Parallel resistors:

\[ v = v_1 = v_2, \quad i_1 = \frac{R_2}{R_1 + R_2} i, \quad \text{and} \quad i_2 = \frac{R_1}{R_1 + R_2} i \]

\[ R_p = \frac{R_1 R_2}{R_1 + R_2} \quad \text{and} \quad v = R_p i \]
**Temperature Sensor**

**Example**

Consider the voltage divider circuit

![Voltage Divider Circuit](image)

The resistor represents a temperature sensor. Suppose the resistance $R$, in $\Omega$, is related to the temperature $T$, in °C, by the equation

$$R = 50 + \frac{1}{2} T$$

Suppose the temperature is expected to be in the range $0°C \leq T \leq 100°C$.

a) Determine the meter voltage, $v_m$, corresponding to temperatures $0°C$, $75°C$ and $100°C$.

b) Determine the temperature, $T$, corresponding to the meter voltages $8$ V, $10$ V and $15$ V.

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**R-2R Ladder Networks**

**Example**

Consider the R-2R ladder network:

![R-2R Ladder Network](image)

Show that

$$v_1 = \frac{1}{2^1} v_s, \quad v_2 = \frac{1}{2^2} v_s, \quad v_3 = \frac{1}{2^3} v_s, \quad v_4 = \frac{1}{2^4} v_s$$

and $v_4 = \frac{1}{2^4} v_s = \frac{1}{16} v_s$