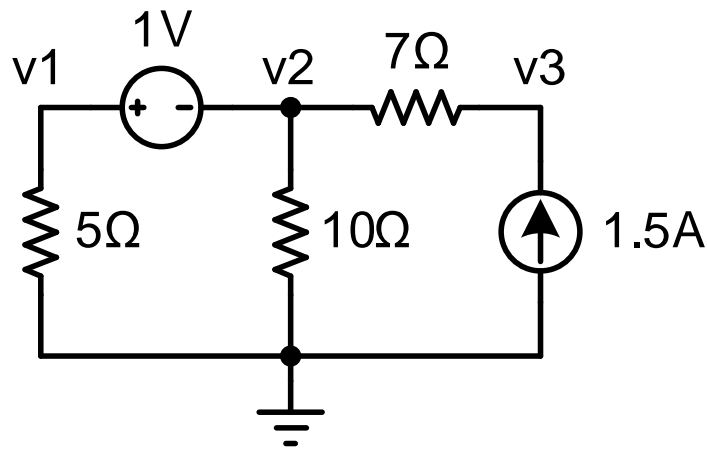


HOMEWORK 3

ECE 580, 2023

Due October 30, 2023

- 1(a). Construct the modified node equations for the circuit shown below. It's similar to HW2, 2022, but the 1V source and the 5Ω resistor are interchanged.
- (b). Find the node voltages.



Solution:

$$\begin{pmatrix} \frac{1}{5\Omega} & 0 & 0 & 1 \\ 0 & \frac{1}{10\Omega} + \frac{1}{7\Omega} & -\frac{1}{7\Omega} & -1 \\ 0 & -\frac{1}{7\Omega} & \frac{1}{7\Omega} & 0 \\ 1 & -1 & 0 & 0 \end{pmatrix} \begin{pmatrix} v_1 \\ v_2 \\ v_3 \\ i_V \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 1.5A \\ 1V \end{pmatrix}$$

$$v_1 = \frac{16}{3}V \approx 5.33V, v_2 = \frac{13}{3}V \approx 4.33V, v_3 = \frac{89}{6}V \approx 14.83V, i_V = -\frac{16}{15}A \approx -1.067A$$