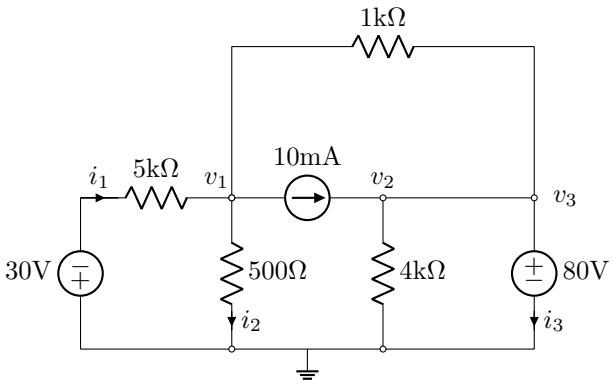
0.1 Problem 1

a) Use the node-voltage method to find i_1, i_2 and i_3.
b) Find if the power dissipated in the circuit equals the power developed.



a)

$$v_3 = 80V$$

At v_1:

$$-10 \times 10^{-3} = \frac{v_1 - (-30)}{5000} + \frac{v_1 - 0}{500} + \frac{v_1 - 80}{1000}$$

$$\rightarrow v_1 = 20V$$

$$\therefore i_1 = \frac{v_1 - (-30)}{5000} = \frac{20 - (-30)}{5000} = 0.01A$$

At v_2:

$$10 \times 10^{-3} = \frac{v_2 - 0}{4000}$$

$$\rightarrow v_2 = 40V$$

$$\therefore i_2 = \frac{v_2 - 0}{4000} = \frac{40}{4000} = 0.01A$$