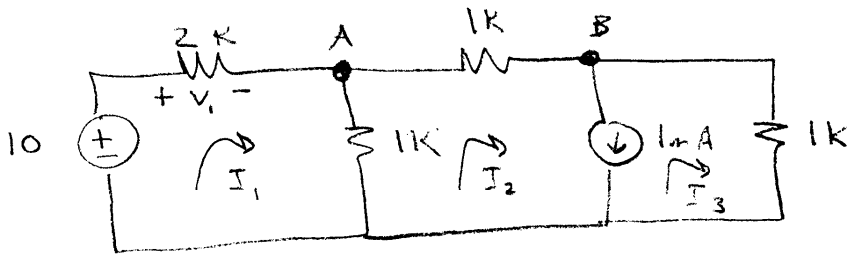


# ECE 210 Q4 Key



nodal

$$\textcircled{A} \quad \frac{A-10}{2000} + \frac{A}{1000} + \frac{A-B}{1000} = 0 \Rightarrow \underline{5A - 2B = 10}$$

$$\textcircled{B} \quad \frac{B-A}{1000} + \frac{B}{1000} + 1\text{mA} = 0 \Rightarrow \underline{-A + 2B = -1}$$

$$\Rightarrow A = 2B + 1$$

$$5(2B+1) - 2B = 10$$

$$8B = 5$$

$$B = 5/8 \text{ V}$$

$$A = 18/8 \text{ V}$$

$$\therefore V_1 = 10 - A = \frac{80}{8} - \frac{18}{8} = \boxed{7.75 \text{ Volts}}$$

loop

$$-10 + 2000 I_1 + 1000 (I_1 - I_2) = 0 \Rightarrow 3000 I_1 - 1000 I_2 = 10 \quad (1)$$

$$-1000 (I_1 - I_2) + 1000 I_2 + 1000 I_3 = 0 \Rightarrow -1000 I_1 + 2000 I_2 + 1000 I_3 = 0 \quad (2)$$

$$I_2 - I_3 = 1\text{mA}$$

$\Rightarrow$

$$1000 I_2 - 1000 I_3 = 1 \quad (3)$$

$$(2) + (3) \Rightarrow -1000 I_1 + 3000 I_2 = 1$$

$$3 \times (1) \Rightarrow 9000 I_1 - 3000 I_2 = 30$$

$$\Rightarrow I_1 = 31/8000 \text{ mA}$$

$$\therefore V_1 = (I_1)(2000) = \boxed{7.75 \text{ Volts}}$$