

Desk Copy

Name Green
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AM

Each problem counts 15%. Do your work on engineering notebook paper. Attach this sheet to the front. Staple in top left hand corner.

- (1) You are given the circuit shown in Figure 1. Find V_1 and V_2 by using nodal analysis.

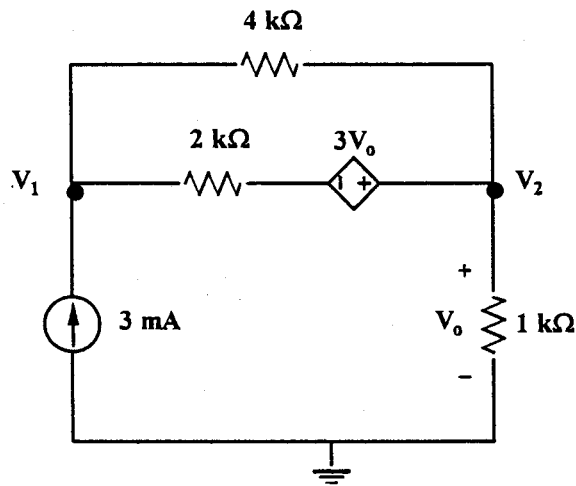


Figure 1: Circuit for problem 1.

- (2) For the circuit shown in Figure 2 find V_1 by using nodal analysis.

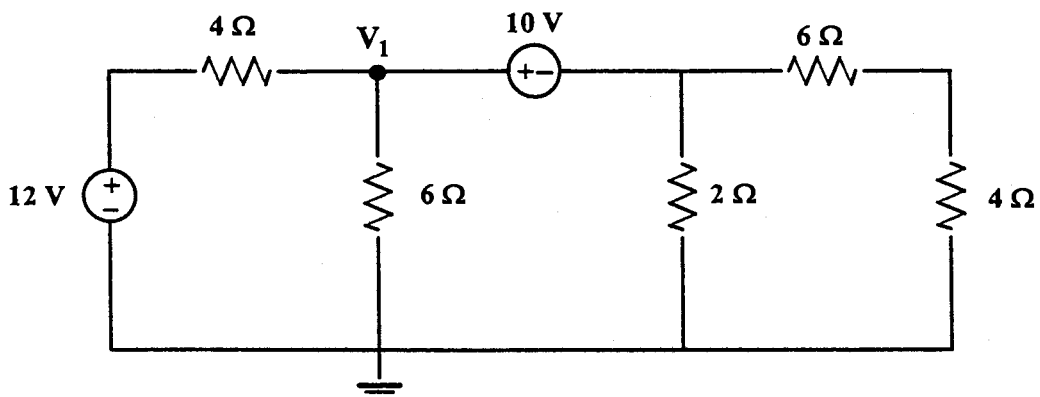
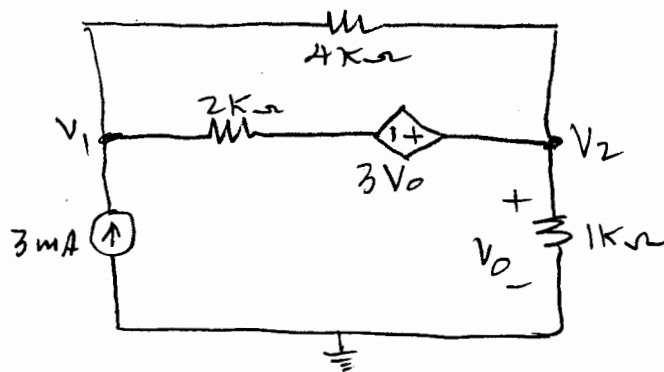


Figure 2: Circuit for problem 2.

Short Test #2

(1) Find V_1 and V_2 using nodal analysis.



At V_1

$$\frac{V_1 + 3V_0 - V_2}{2K} + \frac{V_1 - V_2}{4K} = \frac{3A}{1K} \quad (1)$$

$$2V_1 + 6V_0 - 2V_2 + V_1 - V_2 = 12$$

$$V_0 = V_2$$

so

$$2V_1 + 6V_2 - 2V_2 + V_1 - V_2 = 12$$

$$\boxed{3V_1 + 3V_2 = 12}$$

At V_2

$$\frac{V_2}{1K} + \frac{V_2 - 3V_0 - V_1}{2K} + \frac{V_2 - V_1}{4K} = 0$$

$$V_0 = V_2$$

$$4V_2 + 2V_2 - 6V_2 - 2V_1 + V_2 - V_1 = 0$$

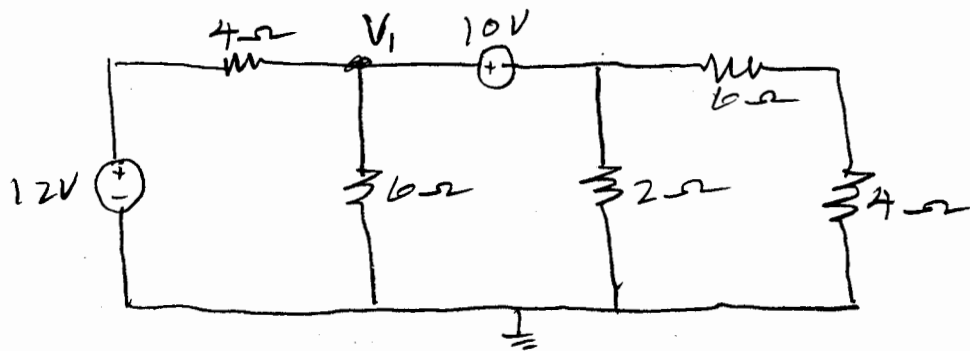
$$\boxed{-3V_1 + V_2 = 0}$$

$$\begin{bmatrix} 3 & 3 \\ -3 & 1 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 12 \\ 0 \end{bmatrix}$$

$$\boxed{V_1 = 1V}$$

$$\boxed{V_2 = 3V}$$

(2) FIND V_1 using nodal analysis.



$$\frac{V_1 - 12}{4} + \frac{V_1}{6} + \frac{V_1 - 10}{2} + \frac{V_1 - 10}{10} = 0$$

$$15V_1 - 180 + 10V_1 + 30V_1 - 300 + 6V_1 - 60 = 0$$

$$61V_1 = 540$$

$$V_1 = 8.85 \text{ V}$$