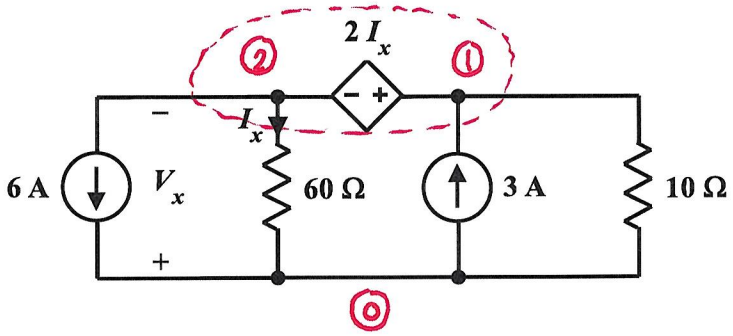
EE 2240

**Homework Problem #047**




Determine the value of $V_x$.

Use nodal analysis:

$$V_1 - V_2 = 2I_x$$

$$6A + V_2/60\Omega - 3A + \frac{V_1}{10\Omega} = 0$$

$$I_x = V_2/60\Omega$$

$$V_x = -V_2$$

In matrix form:

$$\begin{bmatrix} 1 & -1 & -2 & 0 \\ 1/10 & 1/60 & 0 & 0 \\ 0 & -1/60 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ I_x \\ V_x \end{bmatrix} = \begin{bmatrix} 0 \\ -3 \\ 0 \\ 0 \end{bmatrix}$$

Solving yields:

$$V_x = 25\ V$$

(See MATLAB solution on next page.)

```
>> A=[1 -1 -2 0; 1/10 1/60 0 0; 0 -1/60 1 0; 0 1 0 1]

A =

    1.0000   -1.0000   -2.0000         0
    0.1000    0.0167         0         0
         0   -0.0167    1.0000         0
         0    1.0000         0    1.0000

>> c=[0 -3 0 0]'

c =

     0
    -3
     0
     0

>> b=A\c

b =

  -25.8333
  -25.0000
   -0.4167
   25.0000
```