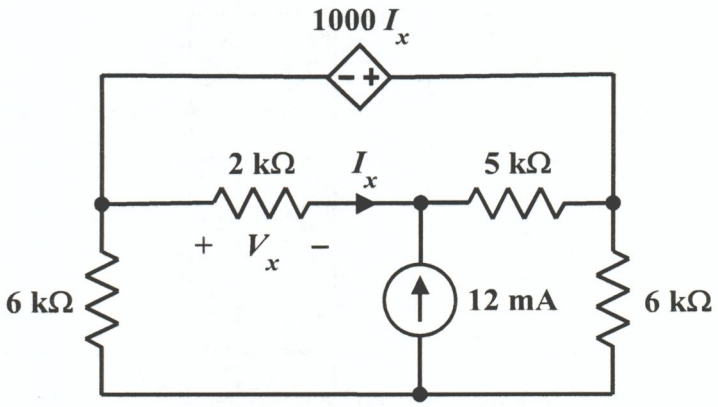
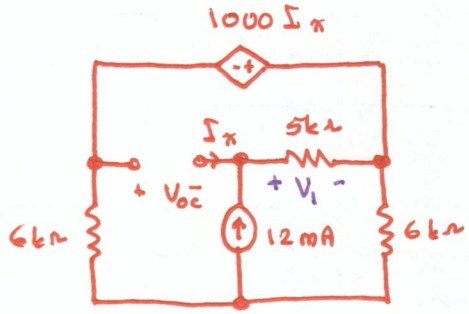
EE 2240

Problem #05

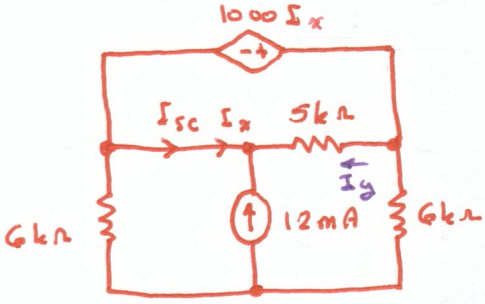
Treat the 2kΩ resistor as the load, and use Thévenin's Theorem to determine V_x.





$I_x = 0 \Rightarrow V_1 = (5k\Omega)(12mA) = 60V$

$\Rightarrow 1000\, I_x = 0 \Rightarrow V_{oc} = -V_1 = -60V$



$I_y = \dfrac{1000\, I_x}{5k\Omega} = \dfrac{1}{5} I_x$

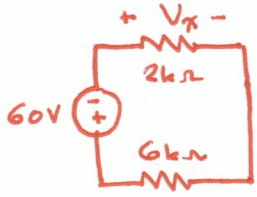
$I_y + I_x = -12mA \Rightarrow 1.2\, I_x = -12mA$

$\therefore I_x = -10mA$

$I_{sc} = I_x = -10mA$

$V_T = V_{oc} = -60V$

$R_T = \dfrac{V_{oc}}{I_{sc}} = \dfrac{-60V}{-10mA} = 6k\Omega$



$V_x = -\dfrac{2k\Omega}{2k\Omega + 6k\Omega}(60V) = -15V$