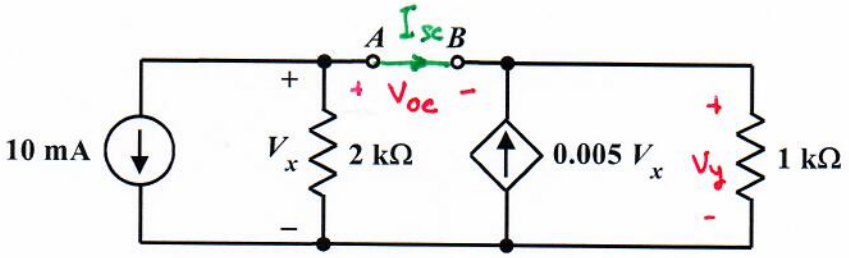
EE/EET 2240

Homework Problem 031



a. Determine and sketch the Thévenin equivalent with respect to terminals A and B.

$V_x = -(2k\Omega)(10mA)$
$= -20V$

$V_y = 0.005\,V_x(1k\Omega)$
$= 0.005(-20V)(1k\Omega)$
$= -100V$

$V_{oc} = V_x - V_y$
$= -20V - (-100V)$
$= 80V$

$I_{sc} = -10mA - \frac{V_x}{2k\Omega} = -0.005V_x + \frac{V_x}{1k\Omega}$

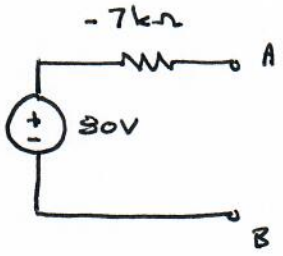
$\Rightarrow \frac{V_x}{2000} - \frac{5V_x}{1000} + \frac{V_x}{1000} = -10mA$

$\Rightarrow V_x = \frac{20}{7}V$

$I_{sc} = -10mA - \frac{20/7\,V}{2k\Omega} = -\frac{80}{7}mA$

$V_T = V_{oc} = 80V$

$R_T = \frac{V_{oc}}{I_{sc}} = \frac{80V}{(-\frac{80}{7}mA)} = -7k\Omega$



b. If connected between terminals A and B, what value of R_L will absorb maximum power from the remainder of the circuit?

$R_L = 7k\Omega$ will absorb maximum power.