Homework #1:
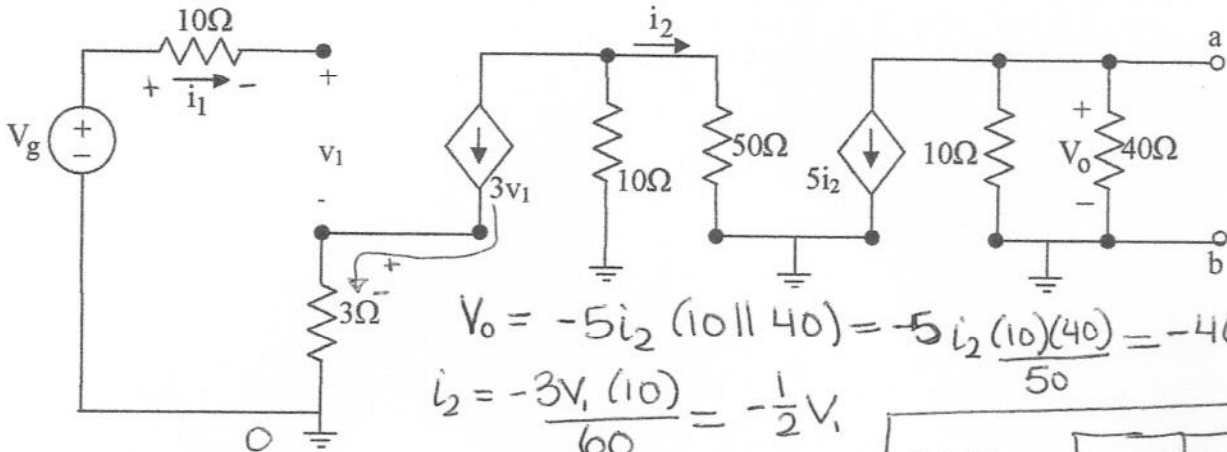
1. Given $V_g = 10mV$, find V_o. Find the Thevenin equivalent between terminals a-b. (Note: $v_1 \neq V_g$)

$V_o = -5i_2 (10 \| 40) = -5 i_2 \dfrac{(10)(40)}{50} = -40 i_2$
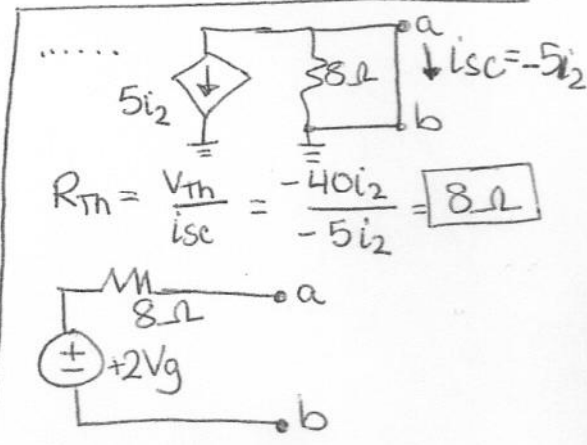
$i_2 = -\dfrac{3V_1 (10)}{60} = -\dfrac{1}{2} V_1$

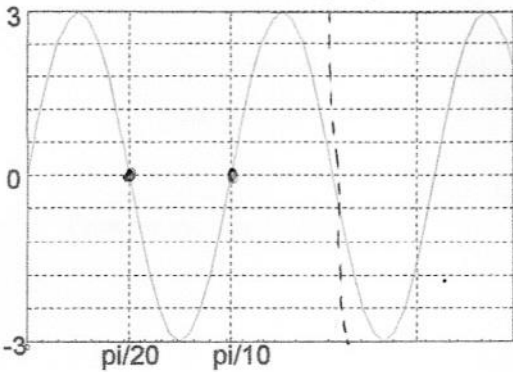$+V_g - 10 i_1 - V_1 - 3V_1 (3) = 0$

$10 V_1 = V_g$

$V_1 = V_g/10$

$\therefore V_o = -40 \left(-\dfrac{1}{2}\right) \left(\dfrac{V_g}{10}\right) = +2 V_g = \boxed{+20mV}$

$V_o = V_{Th}$

$i_{sc} = -5i_2$

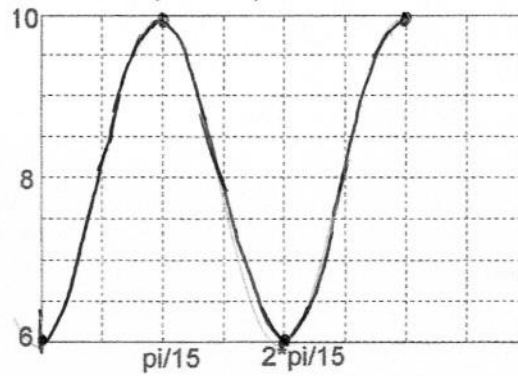$R_{Th} = \dfrac{V_{Th}}{i_{sc}} = \dfrac{-40 i_2}{-5 i_2} = \boxed{8\,\Omega}$

2. Sketch the following waveforms. Identify the dc component of the waveform and the ac component of the waveform.

  a. $Vs = 3\sin(20t)$ V   b. $Vs = 8V + 2\sin(15t - 90°)$ V

  c. $Vs = 6V \pm 0.5V$