EE233 HW0

Sept. 28th

Due Date: Oct. 3rd

1. Find the Norton equivalent with respect to the terminals a, b for the circuit in the following figure.

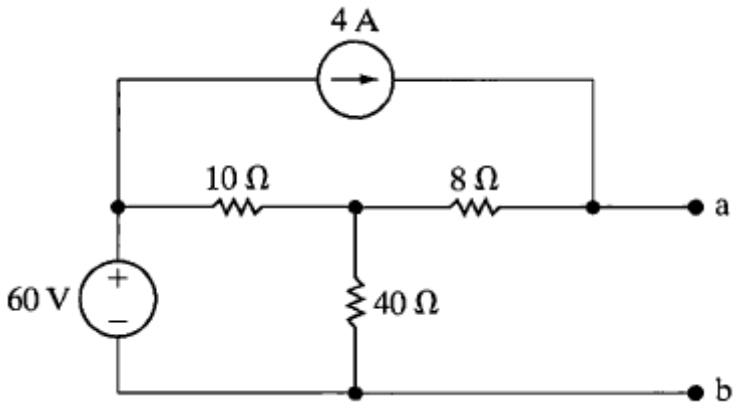

Figure Problem 1

2. The op-amp in the circuit below is ideal.
   a) Calculate v_o when v_g equals 4V.
   b) Specify the range of values of v_g so that the op-amp operates in linear mode.
   c) Assume that v_g equals 2V and that the 63Ω resistor is replaced with variable resistor. What value of the variable resistor will cause the op-amp to saturate?

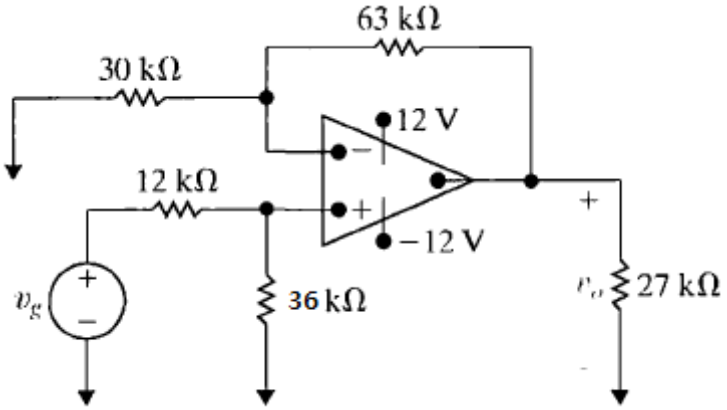

Figure Problem 2

3. The three inductors in the circuit below are connected across the terminals of a black box at $t = 0$. The resulting voltage for $t > 0$ is known to be $v_o = 2000e^{-100t}V$.

   If $i_1(0) = -6A$ *and* $i_2(0) = 1A$, find

   a) $i_0(0)$

   b) $i_0(t), t \geq 0$

   c) $i_1(t), t \geq 0$

   d) $i_2(t), t \geq 0$

   e) the initial energy stored in the three inductors

   f) the total energy delivered to the black box

   g) the energy trapped in the ideal inductors

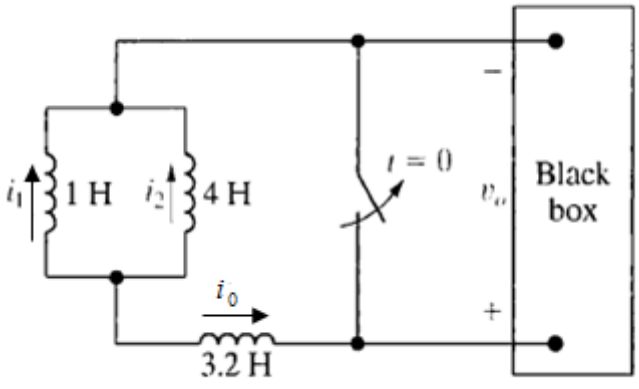

Figure Problem 3

4. After the circuit below has been in operation for a long time, a screwdriver is

inadvertently connected across the terminals a, b. Assume the resistance of the screwdriver is negligible.

a) Find the current in the screwdriver at $t = 0^+$ and $t = \infty$.

b) Derive the expression for the current in the screwdriver for $t \geq 0^+$.

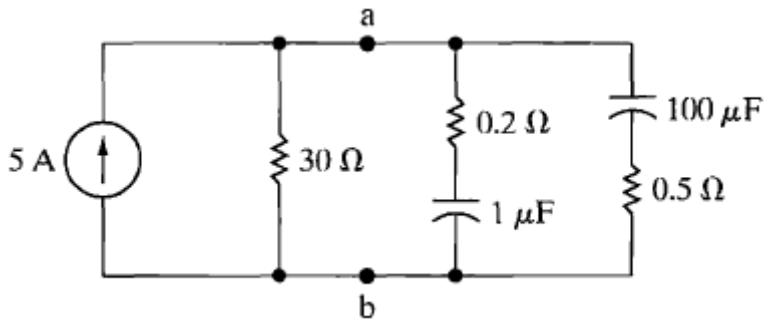

Figure Problem 4

5. The switch in the circuit below has been in position ***a*** for a long time. At $t = 0$, the switch moves instantaneously to position ***b***. Find

a) $v_o(0^+)$

b) $dv_o(0^+)/dt$

c) $v_o(t)\ for\ t \geq 0^+$

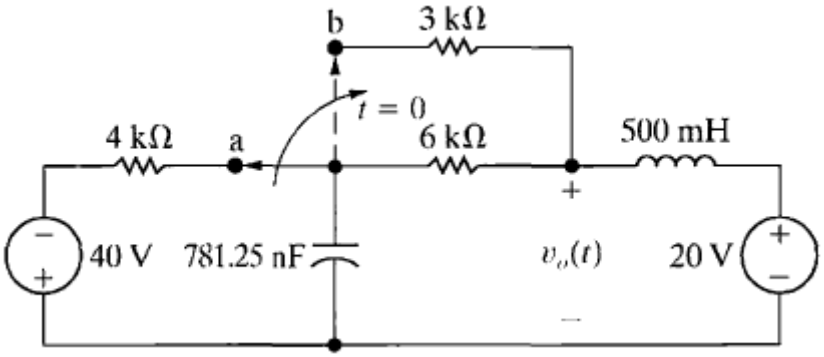

Figure Problem 5

6. Calculate the following complex number: $(1-3j)+\dfrac{2+2j}{1-2j}$

Give answer in both Cartesian (rectangular) and angular (polar, magnitude and phase) form.