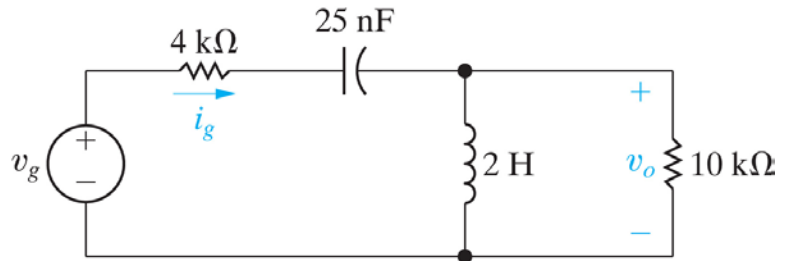**Problem 1:**

In the circuit to the right, find the steady-state expression for $v_o(t)$ if

$v_g(t) = 45\cos(10{,}000t)$ V.
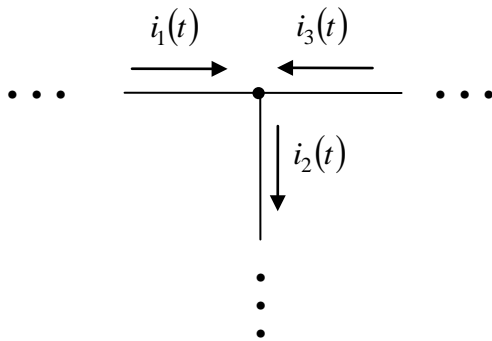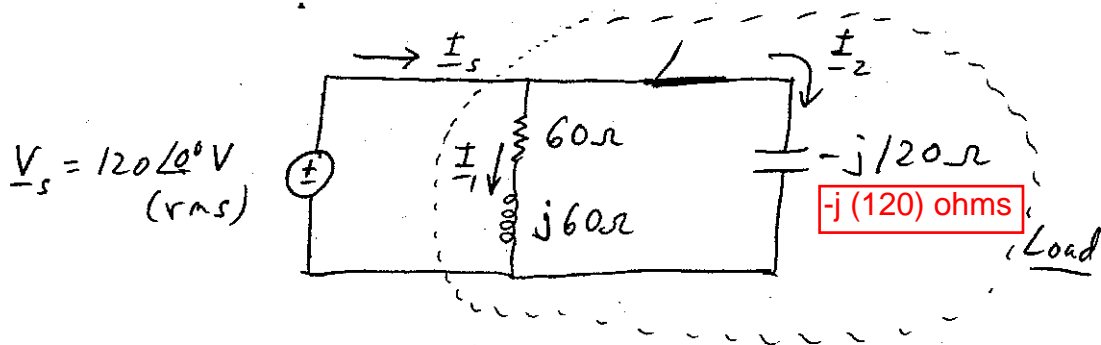
Hint: Use a voltage divider.

Problem 2:

A node with three branches is shown below. Suppose that this node is part of a circuit that is operating in the sinusoidal steady-state with

$$i_1(t) = 3\cos(2000t - 45°) \quad mA \qquad\qquad i_2(t) = 4\cos(2000t + 30°) \quad mA$$

What is the expression for the steady-state current $i_3(t)$ in terms of a single cosine function?

$V_s = 120 \angle 0° V$ (rms)

60Ω

$j60\Omega$

$-j120\Omega$

-j (120) ohms

Load

(a) For the branch containing the 60 ohm resistor and $j60$ ohm inductor, please compute the following quantities and place your answers on the lines (including proper units).

Complex power _____

Average power _____

Apparent power _____

Peak amplitude of the current, $i_1(t)$ _____

Power factor (include lagging/leading) _____

Maximum value of instantaneous power. _____

(b) For the *voltage source*, please compute the following quantities and place your answers on the lines (including proper units). The capacitor is connected in parallel with the resistor and inductor.

Complex power _____

Average power _____

Apparent power _____

Peak amplitude of the source current, $i_s(t)$ _____

Power factor (include lagging/leading) _____

Maximum value of instantaneous power. _____