7. (Continuation) A common electrical engineering problem is to calculate currents in an electric circuit. For example, the circuit shown in the figure with R_i (ohms), C_i (microfarads), L (millihenries), and ω (hertz) leads to the system

$$\begin{cases} (50-10i)I_1 + (50)I_2 + (50)I_3 = V_1 \\ (10i)I_1 + (10-10i)I_2 + (10-20i)I_3 = 0 \\ -(30i)I_2 + (20-50i)I_3 = -V_2 \end{cases}$$

Select V_1 to be 100 millivolts, and solve two cases:

[a] **a.** The two voltages are in phase; that is, $V_2 = V_1$.

[a] **b.** The second voltage is a quarter of a cycle ahead of the first; that is, $V_2 = iV_1$.

Use the complex arithmetic version of *Naive_Gauss*, and in each case, solve the system for the amplitude (in milliamperes) and the phase (in degrees) for each current I_k. *Hint:* When $I_k = \text{Re}(I_k) + i\,\text{Im}(I_k)$, the amplitude is $|I_k|$, and the phase is $(180^\circ/\pi)\arctan[\text{Im}(I_k)/\text{Re}(I_k)]$. Draw a diagram to show why this is so.