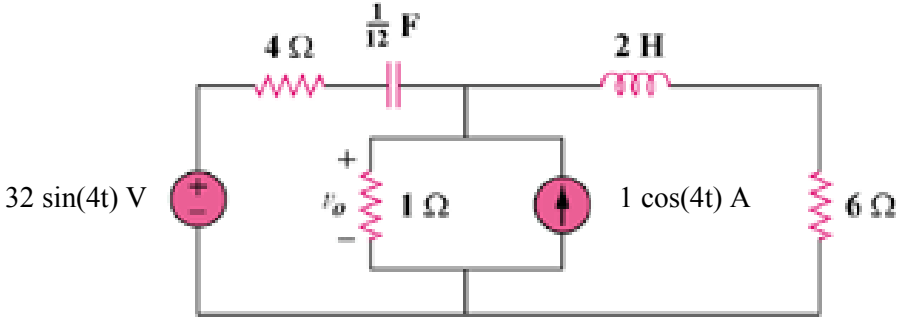
SKEE 1023 CIRCUIT THEORY
SECTION 13
TUTORIAL 7: AC CIRCUITS

1. Problem 9.5
   Given $v_1 = 20\sin(\omega t + 60°)$ and $v_2 = 60\cos(\omega t - 10°)$, determine the phase angle between the two sinusoids and which one lags the other

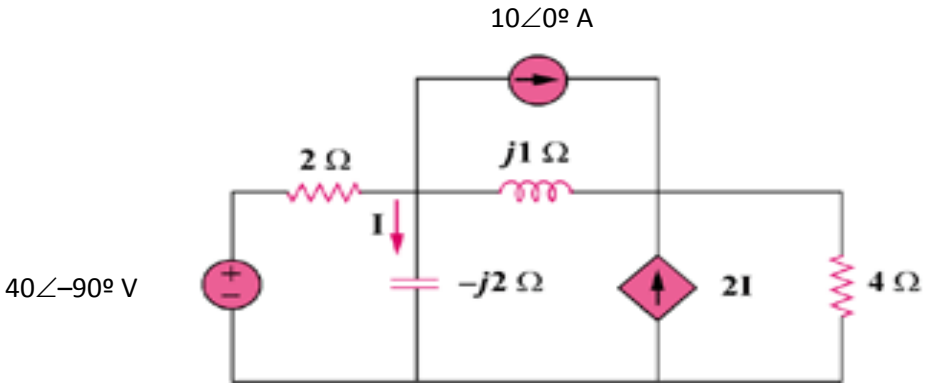
2. Problem 9.17
   Two voltages v_1 and v_2 appear in series so that their sum is $v = v_1 + v_2$. If $v_1 = 10\cos(50t - \pi/3)$ V and $v_2 = 12\cos(50t + 30°)$ V. Find v.

3. Problem 10.3
   Determine v_o



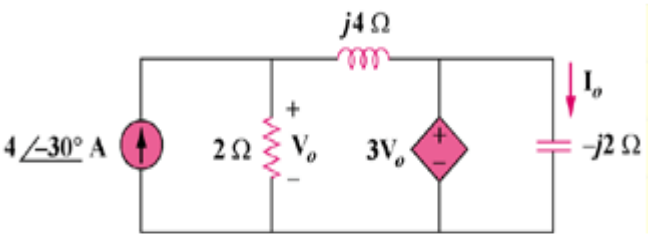
4. Problem 10.15

   Solve for the current **I** using nodal analysis.



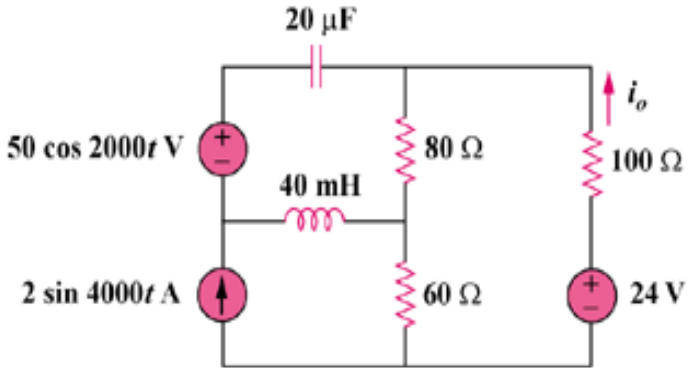
5. Problem 10.32

Determine $\mathbf{V}_o$ and $\mathbf{I}_o$ mesh analysis.



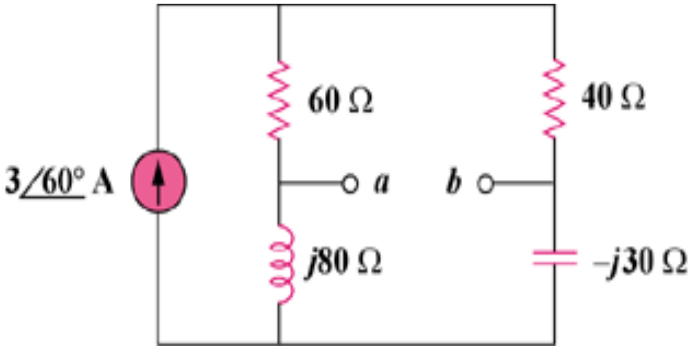
6. Problem 10.48

Find i_o using superposition.



7. Problem 10.64

Find the Norton equivalent circuit at terminals *a*-*b*.

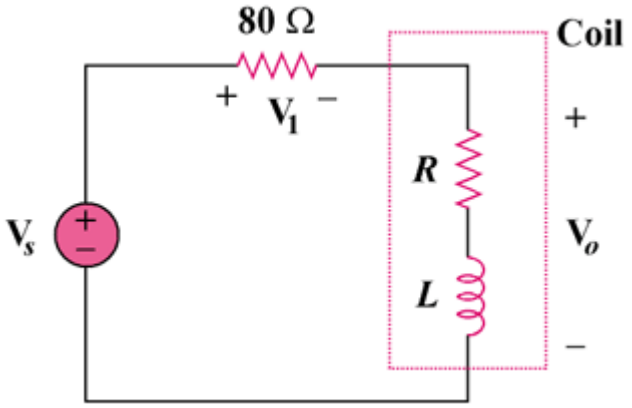


8. Problem 9.90 (Assignment group G)

An industrial coil is modeled as a series combination of an inductance L and resistance R. Since an ac voltmeter measures only the magnitude of a sinusoid, the following measurements are taken at 60 Hz when the circuit operates in the steady state:

$$|V_s| = 145\text{V}, \qquad |V_1| = 50\text{V}, \qquad |V_o| = 110\text{V}$$

Use these measurements to determine the values of L and R.



9. Problem 10.75 (Assignment group H)

Find the closed-loop gain and phase shift of the output voltage with respect to the input voltage if $C_1 = C_2 = 1$ nF, $R_1 = R_2 = 100$ kΩ, $R_3 = 20$ kΩ, $R_4 = 40$ kΩ, and $\omega = 2000$ rad/s.