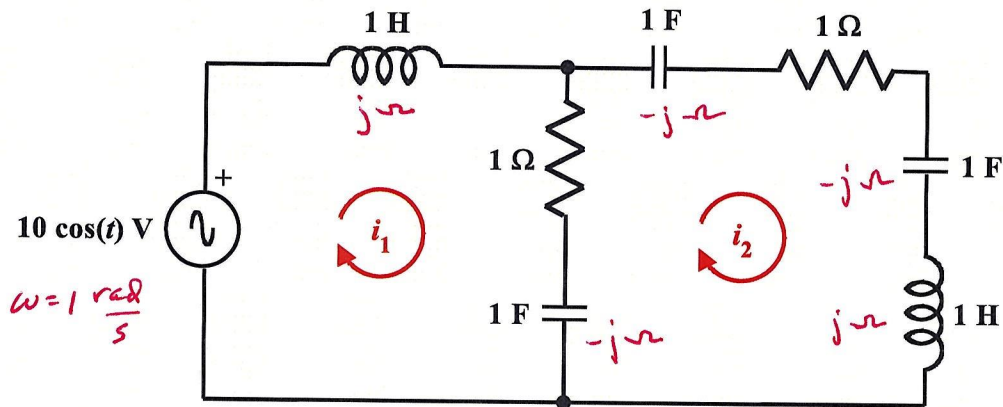


## Homework Problem #010

Use the phasor analysis method to solve for the AC steady-state mesh currents, and then express each as a function of time with the phase angles in degrees.



$$jI_1 + (1-j)(I_1 - I_2) = 10 \angle 0^\circ$$

$$(1-j)(I_2 - I_1) + (-j + 1 - j + j)I_2 = 0$$

In matrix form:

$$\begin{bmatrix} 1 & j-1 \\ j-1 & 2-j^2 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \end{bmatrix}$$

Solving yields:

$$I_1 = 10 - j10 = 10\sqrt{2} \angle -45^\circ \text{ A}$$

$$I_2 = 5 - j5 = 5\sqrt{2} \angle -45^\circ \text{ A}$$

$$\therefore i_1(t) = 10\sqrt{2} \cos(t - 45^\circ) \text{ A}$$

$$i_2(t) = 5\sqrt{2} \cos(t - 45^\circ) \text{ A}$$