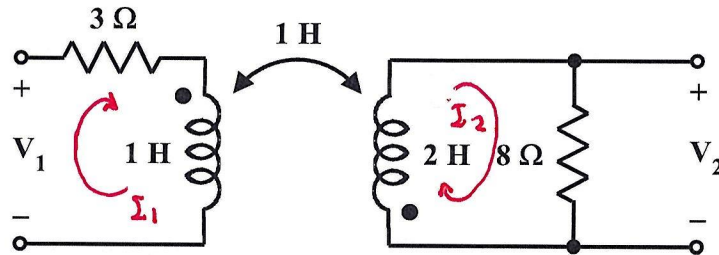


Homework Problem #034

Determine the voltage transfer function V_2/V_1 . Show your work.



$$3I_1 + j\omega L I_1 + j\omega L I_2 = -V_1$$

$$j\omega L I_2 + j\omega L I_1 + 8I_2 = 0$$

$$\begin{bmatrix} 3+j\omega & j\omega \\ j\omega & 8+j\omega 2 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} -V_1 \\ 0 \end{bmatrix}$$

$$I_2 = \frac{\begin{vmatrix} 3+j\omega & -V_1 \\ j\omega & 0 \end{vmatrix}}{\begin{vmatrix} 3+j\omega & j\omega \\ j\omega & 8+j\omega 2 \end{vmatrix}} = \frac{-j\omega V_1}{(3+j\omega)(8+j\omega 2) - (j\omega)^2}$$

$$= \frac{-j\omega V_1}{24 + j\omega 14 - 2\omega^2 + \omega^2} = \frac{-j\omega V_1}{(24 - \omega^2) + j\omega 14}$$

$$V_2 = 8I_2 = \frac{-j\omega 8V_1}{(24 - \omega^2) + j\omega 14}$$

$$\therefore \frac{V_2}{V_1} = \frac{-j\omega 8}{(24 - \omega^2) + j\omega 14}$$