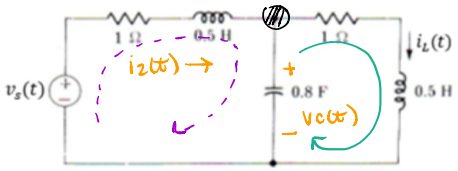
Hoja de trabajo No. 2

1. Encuentre la función de transferencia $\frac{I_L(s)}{V_s(s)}$. Determine la corriente del inductor para $v_s(t) = 2H(t)\,V$.



TAREA: calcular $\frac{V_c(s)}{V_s(s)} = H(s)$

sumatoria de corrientes.

$$i_c(t) = 0.8\frac{d}{dt}v_c(t)$$

$$① \quad 0.8\frac{d}{dt}v_c(t) + i_L(t) = i_2(t)$$

sumatoria de voltajes

$$-v_s(t) + R\,i_2(t) + L\frac{d}{dt}i_2(t) + v_c(t) = 0$$

$$-v_s(t) + i_2(t) + 0.5\frac{d}{dt}i_2(t) + v_c(t) = 0 \quad ②$$

sumatoria de voltajes

$$-v_c(t) + R\,i_L(t) + L\frac{d}{dt}i_L(t) = 0$$

$$-v_c(t) + i_L(t) + 0.5\frac{d}{dt}i_L(t) = 0$$

Asumo cond. iniciales = 0

$$0.8\,s\,V_c(s) + I_L(s) = I_2(s) \quad \text{EC \#1}$$

$$-V_s(s) + I_2(s) + 0.5\,s\,I_2(s) + V_c(s) = 0 \quad \text{EC \#2}$$

$$-V_c(s) + I_L(s) + 0.5\,s\,I_L(s) = 0 \quad \text{EC \#3}$$

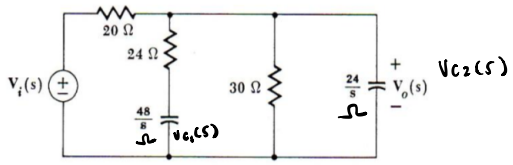
• reordenado.

$$0.8s\,V_c(s) - I_2(s) + I_L(s) = 0$$

$$V_c(s) + (1 + 0.5s)\,I_2(s) = V_s(s)$$

$$-V_c(s) + (1 + 0.5)\,I_L(s) = 0$$

2. Encuentre la función de transferencia $\frac{V_o(s)}{V_i(s)}$. Determine la corriente del inductor para $v_s(t) = 2H(t)\ V$.



resistor $v(t) = Ri(t)$

$V(s) = RI(s)$

$Z_R = \frac{V(s)}{I(s)} = R\ \Omega$

capacitor:

$$i(t) = C\frac{d}{dt}v(t)$$

$$I(s) = C[sV(s) - v(0)]$$

con $v(0) = 0$, $I = CsV(s)$

$$Z_C = \frac{V(s)}{I(s)} = \frac{1}{Cs}\ \Omega \quad \Rightarrow \quad \frac{48}{s}\ \Omega = \frac{1}{Cs}\ \Omega$$

$$C = \frac{1}{48}\ F$$

inductor: $v(t) = L\frac{di}{dt}(t)$

$$V(s) = L[sI(s) - i(0)]$$

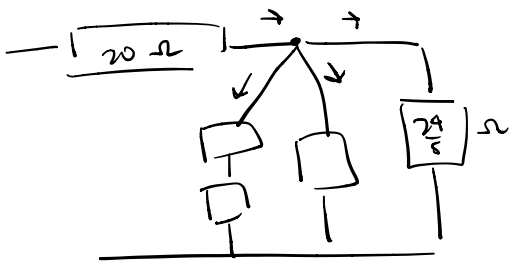
con $i(0) = 0$

$$V(s) = LsI(s)$$

$$Z_L = \frac{V(s)}{} = Ls\ \Omega$$

I(s)

Calcular $\frac{V_{o2}(s)}{V_i(s)}$



$Z_C = \frac{V_C}{I_C}$ $I_C = \frac{V_C}{Z_C}$

$Z_R = \frac{V_R}{I_R}$ $I_R = \frac{V_R}{Z_R}$

$\frac{s V_{o1}}{48} + \frac{V_{o2}}{30} + \frac{s V_{o2}}{24} = \frac{V_i - V_{o2}}{20}$ (EC #1) $(\ )V_{o1} + (\ )V_{o2} = (\ )$

$-V_i + V_i - V_{o2} + 24\, s\frac{V_{o1}}{48} + V_{o1} = 0$ (EC #2)

$\rightarrow a V_{o1} + b V_{o2} = c V_i$ $a V_{o1} = a(s) V_{o1}(s)$

$d V_{o1} + e V_{o2} = 0$

$A = \begin{bmatrix} a & b \\ d & e \end{bmatrix}$, $\det(A) = ae - bd$

$V_{o2} = \frac{\det\left(\begin{vmatrix} a & cV_i \\ d & 0 \end{vmatrix}\right)}{\det(A)}$ $V_{o2} = \frac{-cdV_i}{ae - bd}$

$b(s) = \frac{V_{o2}(s)}{V_i(s)} = \frac{cd}{bd - ae}$