Tarea semanal 9

$$Z(s) = \frac{(s^2+3)(s^2+1)}{s(s^2+2)} = \frac{K_0}{s} + \sum \frac{2K_i s}{s^2+\omega_i^2} + K_\infty s$$

$$Y(s) = \frac{s(s^2+2)}{(s^2+3)(s^2+1)} =$$

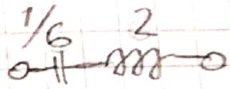
$$K_0 = \lim_{s\to 0} s\,Y(s) = 0 \qquad K_\infty = \lim_{s\to\infty} \frac{1}{s} Y(s) = 0$$

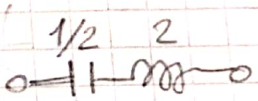
$$2K_1 = \lim_{s^2\to -1} \frac{s^2+1}{s} Y(s) = 1/2$$

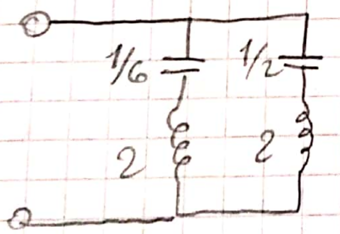
$$2K_2 = \lim_{s^2\to -3} \frac{s^2+3}{s} Y(s) = 1/2$$

$$Y(s) = \frac{0.5s}{s^2+3} + \frac{0.5s}{s^2+1}$$

$$Y_1 = \frac{1}{2s+\frac{6}{s}} \qquad Y_2 = \frac{1}{2s+\frac{2}{s}}$$







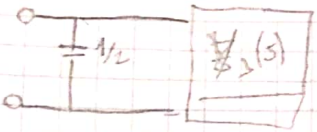
b) $$Z(s) = \frac{s^4+4s^2+3}{s^3+2s}$$

Cauer I

$$\lim_{s\to\infty} Z(s)\cdot s^{-1} = 1$$

$$Z_1(s) = Z(s) - s = \frac{2s^2+3}{s^3+2s}$$

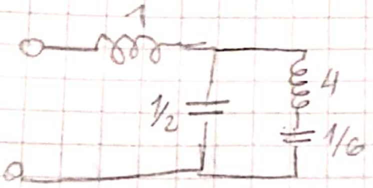
$Y_2(s)$



$$\lim_{s\to\infty} \frac{Y_2(s)}{s} = \frac{s^3+2s}{2s^3+3s} = 1/2$$

$$Y_3(s) = Y_2(s) - \frac{s}{2} = \frac{s^3 - s^3 + 2s - 1{,}5s}{2s^2+3} = \frac{1/2\, s}{2s^2+3} = \frac{1}{4s + \frac{6}{s}}$$

$Z(s)$



Cauer II

$$Z(s) = \frac{4s^2+s^4+3}{s^3+2s} = \frac{(s^2+1)(s^2+3)}{s(s^2+2)}$$

$$2K_i = \lim_{s^2\to -2} \frac{(s^2+2)}{s} Z(s) = 1/2$$

$$Z_2(s) = \frac{(s^2+1)(s^2+3)}{s(s^2+2)} - \frac{1/2\, s}{s^2+2} = \frac{s^4+4s^2+3-0{,}5s^2}{s^2(s^2+2)}$$

$$Z_2(s) = \frac{(s^2+3/2)(s^2+2)}{s}$$

Esto NO

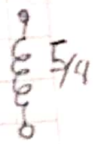
Cauer II

$$Z(s) = \frac{4s^2+s^4+3}{s(s^2+2)}$$

$$\lim_{s\to 0} s Z(s) = 3/2$$

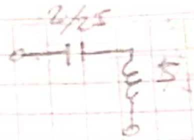
$$Z_2(s) = \frac{s^4+4s^2+3}{s(s^2+2)} - \frac{1{,}5}{s} = \frac{s^4+2{,}5s^2}{s(s^2+2)} = \frac{s^2(s^2+2{,}5)}{\cancel{s}(s^2+2)}$$

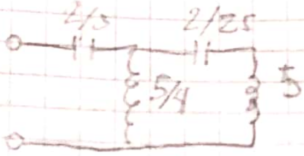
$$Y_2(s) = \frac{s^2+2}{s(s^2+2{,}5)} \to k_0 = \lim_{s\to 0} s\,Y_2(s) = 4/5$$



$$Y_3(s) = \frac{s^2+2}{s(s^2+2{,}5)} - \frac{4/5}{s} = \frac{1/5\, s^2}{\cancel{s}(s^2+2{,}5)}$$

$Z_3(s) = \frac{s^2+2,5}{1/5\,s} = 5s + 12,5\,\frac{1}{s}$





2) $Y(s) = \frac{3s(s^2+7/3)}{(s^2+2)(s^2+5)}$

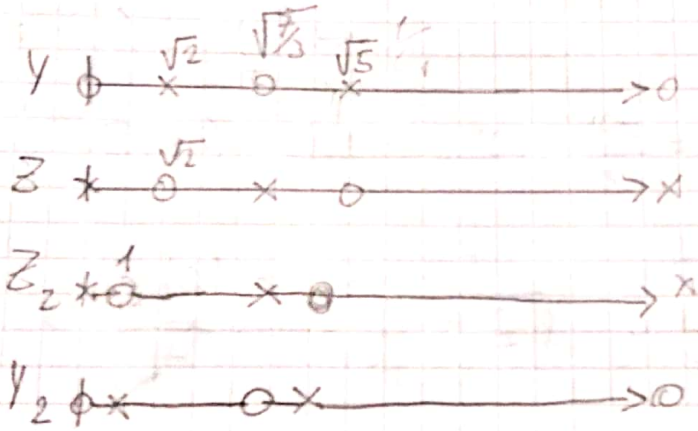
$\frac{1}{C_2 L_2} = 1 \quad \begin{cases} L_2 = 1 \\ C_2 = 1 \end{cases}$

$sL + \frac{1}{sC} = \frac{s^2 + 1/LC}{s\,1/L}$

Los polos se desplazan hacia el x removido

$\frac{s\,1/L}{s^2+\frac{1}{LC}} = \frac{2K_i s}{s^2+\omega_i^2}$

Parcial

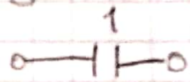


$Z(s) = \frac{s^4+7s^2+10}{3s(s^2+7/3)} = \frac{k_0'}{s} + Z_2(s)$

$Z_2(j1) = 0$

$Z(j1) = \frac{1}{j}$

$k_0' = 1$



$Z_2(s) = \frac{s^4+4s^2+3}{3s(s^2+7/3)}$

$Y_2(s) = \frac{3s(s^2+7/3)}{s^4+4s^2+3} = \frac{3s(s^2+7/3)}{(s^2+1)(s^2+3)}$

$2K_i = \lim_{s^2 \to (-1)} Y_2(s)\frac{(s^2+1)}{s} = 2 \longrightarrow \left[L_2 = \frac{1}{2} \quad C_2 = 2\right]$

$Y_3 = Y_2 - \frac{2s}{s^2+1} = \frac{3s^3+7s-2s^3-6s}{(s^2+1)(s^2+3)} = \frac{s}{s^2+3}$

$\left[L_3 = 1 \quad C_2 = 1/3\right]$