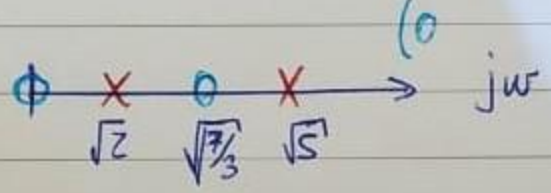
Tarea Semanal 11

Sintetizar un cuadripolo con los siguientes parámetros

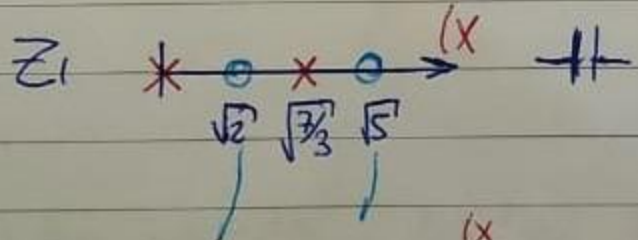
$$Y_{11} = \frac{I_1}{V_1}\Big|_{V_2=0} = \frac{3s(s^2+7/3)}{(s^2+2)(s^2+5)}$$

$$Y_{21} = \frac{I_2}{V_1}\Big|_{V_2=0} = \frac{s(s^2+1)}{(s^2+2)(s^2+5)}$$

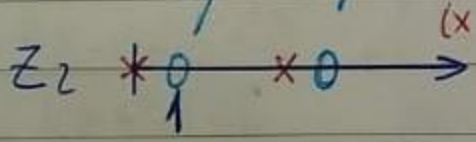
Graficamos Y_{11}

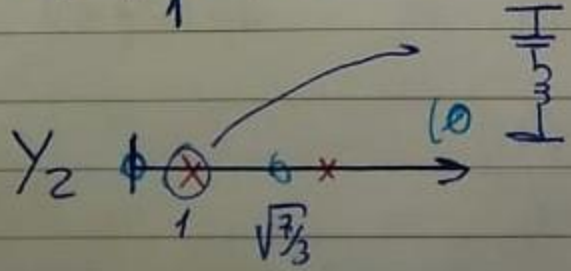


Necesitamos remover parcialmente el capacitor para que nos quede la singularidad de $\sqrt{2}$ en 1 y además tuvimos que $A = (s^2+2)(s^2+5)$ y queremos tener un cero en 1 y un cero

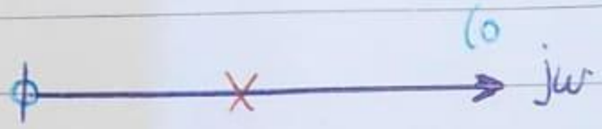


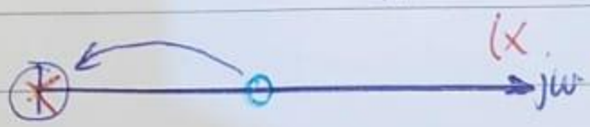
Removemos parcialmente capacitor un cero





Invertimos y removemos polo en cero

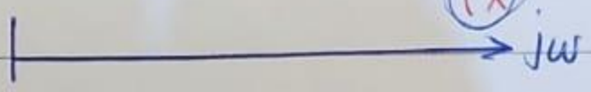
Y_3 

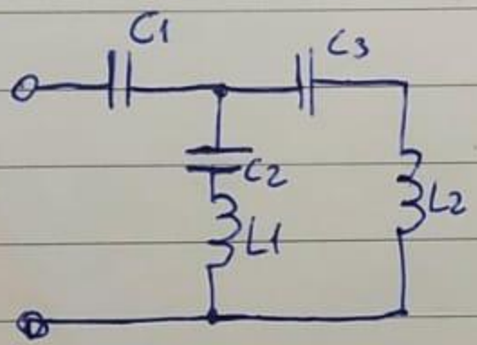
Z_3 

Inversiones y removemos polo en cero

Nos queda un polo

Nos queda un polo en infinito

Z_4 



$$\lim_{s \to j1} s \cdot Z_1(s) = \lim_{s \to j} \frac{s \cdot (s^2+2)(s^2+5)}{3s(s^2+7/3)} = 1$$

$$C_1 = 1$$

$$Z_2 = Z_1 - \frac{1}{s} = \frac{(s^2+2)(s^2+5) - 3(s^2+7/3)}{3s(s^2+7/3)} = \frac{s^4+7s^2+10-3s^2-7}{3s(s^2+7/3)}$$

$$Z_2 = \frac{s^4+4s^2+3}{3s(s^2+7/3)} = \frac{(s^2+3)(s^2+1)}{3s(s^2+7/3)}$$

$$Y_2 = \frac{3s(s^2+7/3)}{(s^2+3)(s^2+1)} \qquad \lim_{s\to j} \frac{(s^2+1)}{s} \cdot \frac{3s(s^2+7/3)}{(s^2+3)(s^2+1)} = \frac{4}{2} = 2$$

$$C_2 = 1/2 \qquad L_1 = 2$$

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

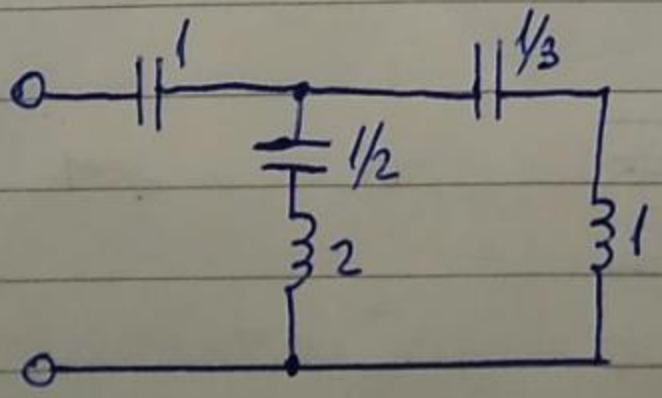
$$Y_3 = \frac{s}{(s^2+3)}$$

$$Z_3 = \frac{s^2+3}{s} \qquad \lim_{s\to 0} Z_3(s).s = \lim_{s\to 0} \frac{(s^2+3)}{s}.s = 3$$

$$C_3 = 1/3$$

$$Z_4(s) = Z_3(s) - \frac{3}{s} = \frac{(s^2+3)-3}{s} = \frac{s^2}{s} = s$$

$$L_2 = 1$$



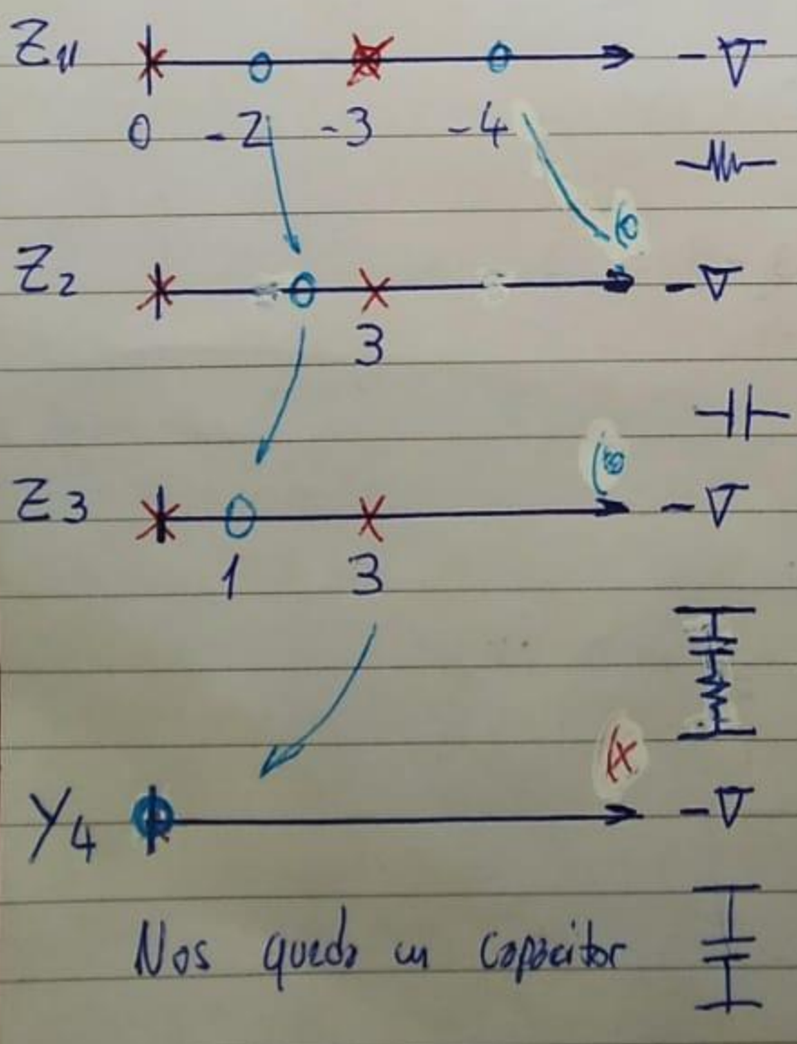
2) Dada la transferencia

$$T(s) = \frac{V_2}{V_1}\Big|_{I_2=0} = \frac{K\cdot(s+1)}{(s+2)(s+4)}$$

$$Z_{21} = \frac{(s+1)}{A} \qquad Z_{11} = \frac{(s+2)(s+4)}{A}$$

Proponemos $A = s(s+3)$

$$Z_{11} = \frac{(s+2)(s+4)}{s(s+3)}$$

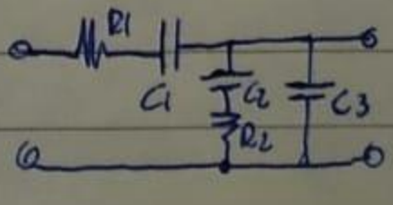


Nos queda un capacitor

Removemos esa resistencia a infinito

Removemos paralelamente capacitor en cero de forma de llevar al cero a 1

Invertimos y removemos polo en 1



$\lim_{s\to\infty}$ $Z_{11} = 1$ $\qquad R_1 = 1$

$$Z_2 = \frac{(s+2)(s+4) - s(s+3)}{s(s+3)} = \frac{3s+8}{s(s+3)} = \frac{3(s+8/3)}{s+(s+3)}$$

$$\lim_{s\to 1} \quad Z_2 \cdot s = \frac{3(s+8/3)\cdot s}{s(s+3)} = \frac{s}{2} \qquad C_1 = 2/5$$

$$Z_3 = Z_2 - \frac{5/2}{s} = \frac{3(s+8/3) - 5/2(s+3)}{s(s+3)} = \frac{1/2(s+1)}{s(s+3)}$$

$$Y_3 = \frac{s(s+3)}{1/2(s+1)}$$

$C_2 = 4$; $R_2 = 1/4$

$$\lim_{s\to -1} \quad \frac{(s+1)}{s} \cdot \frac{s(s+3)}{1/2(s+1)} = 4$$

$$Y_4 = Y_3 - \frac{5.4}{s+1} = \frac{s(s+3) - 4.1/2 s}{1/2(s+1)} = \frac{s(s+1)}{1/2(s+1)} = 2.s$$

$Y_4 = 2.s$ $\qquad C_3 = 2$