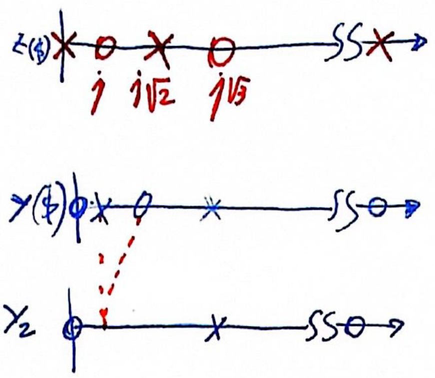
HOJA 1

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

a) Foster en versión derivación



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

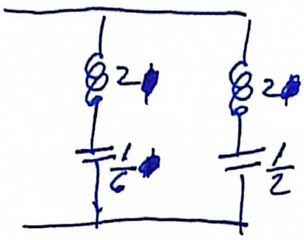
$$2K_1 = \lim_{s^2 \to -1} \frac{s^2+1}{s} \cdot \frac{s(s^2+2)}{(s^2+1)(s^2+3)} = \frac{1}{2}$$

$$2K_1 = \frac{1}{2}$$

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

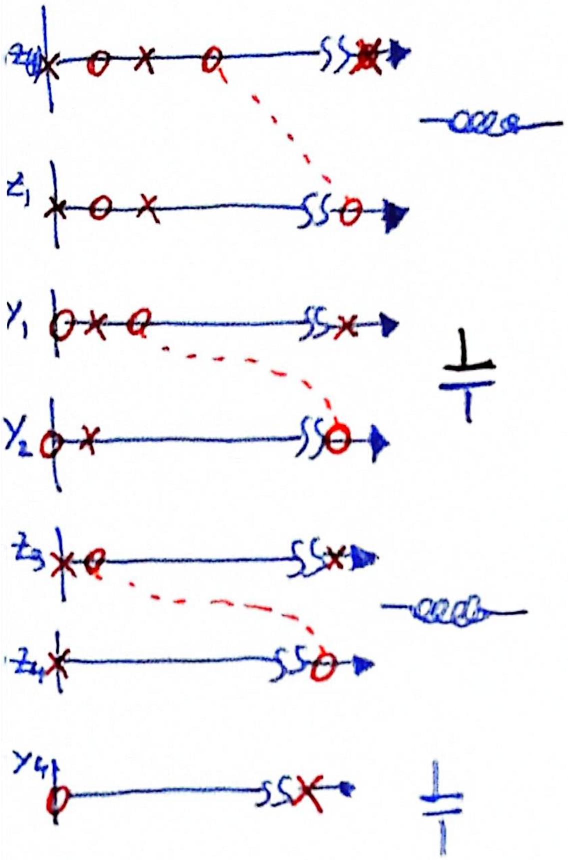
$$Y_2 = \frac{\frac{s^3}{2}+\frac{s}{2}}{(s^2+3)(s^2+1)} = \frac{s(s^2+1)\frac{1}{2}}{(s^2+1)(s^2+3)} = \frac{\frac{1}{2}s}{s^2+3}$$

$$Y(s) = \frac{\frac{1}{2}s}{s^2+1} + \frac{\frac{1}{2}s}{s^2+3} = \frac{1}{2s+\frac{1}{\frac{1}{6}s}} + \frac{1}{2s+\frac{1}{\frac{1}{2}s}}$$

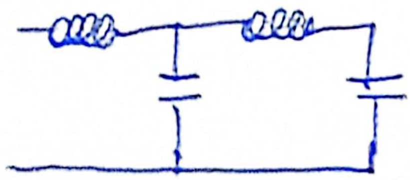


b) Cauer Removiendo al ∞

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



La red quedara con la siguiente topologia:



Aplicando el método interactivo

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

$$s^4 + 4s^2 + 3 \;\big|\; s^3 + 2s$$

$-\; s^4 + 2s^2$ → s → 1

$s^3 + 2s \;\big|\; 2s^2 + 3$

$-\; s^3 + \frac{3}{2}s$ → $\frac{1}{2}s$ → $\frac{1}{2}$

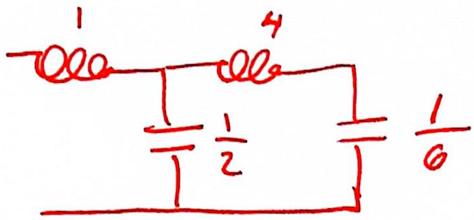
$2s^2 + 3 \;\big|\; \frac{s}{2}$

$-\; 2s^2$ → $4s$ → 4

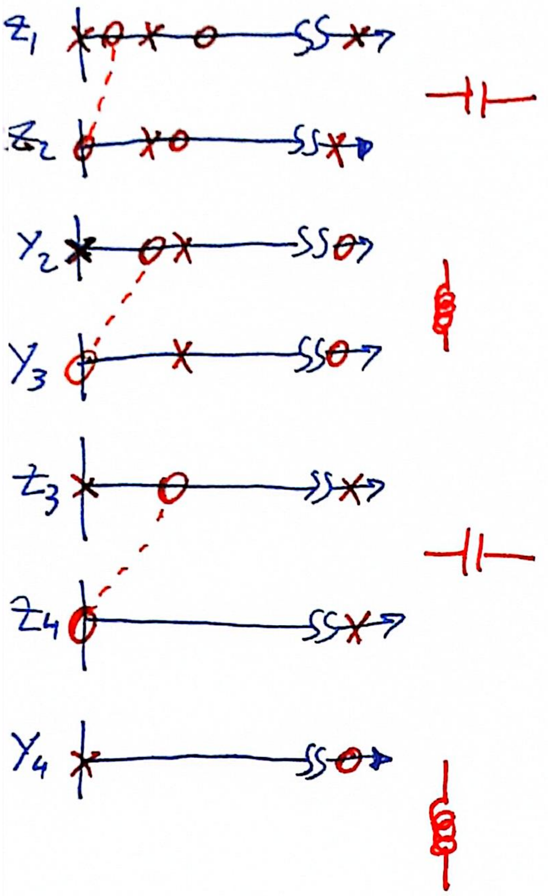
$\frac{s}{2} \;\big|\; 3$

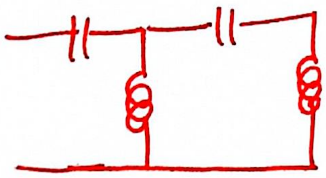
$-\; \frac{s}{2}$ → $\frac{s}{6}$ → $\frac{1}{6}$

0



b) Cauer al origen: $Z(s) = \dfrac{(s^2+3)(s^2+1)}{s(s^2+2)} = \dfrac{s^4+4s^2+3}{s^3+2s}$





HOJA 3

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

$$3 + 4s^2 + s^4 \;\big|\; 2s + s^3$$

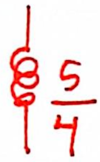
$$- \left(3 + \frac{3}{2}s^2\right) \qquad \frac{3}{2s}$$

$$0 + \frac{5}{2}s^2 + s^4$$

$$2s + s^3 \;\big|\; 0 + \frac{5}{2}s^2 + s^4$$

$$- \left(2s + \frac{4}{5}s^3\right) \qquad \frac{4}{5}\frac{1}{s}$$

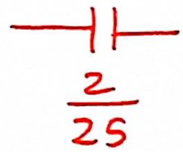
$$\frac{s^3}{5}$$



$$\frac{5}{2}s^2 + s^4 \;\big|\; \frac{s^3}{5}$$

$$- \frac{5}{2}s^2 \qquad \frac{25}{2}\frac{1}{s}$$

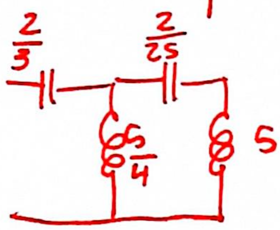
$$s^4$$



$$\frac{s^3}{5} \;\big|\; s^4$$

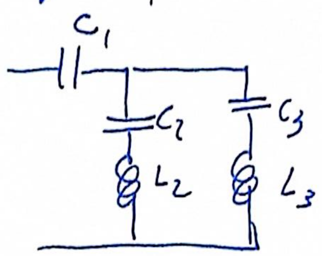
$$- \frac{1}{5}s^3 \qquad \frac{1}{5s}$$

$$0$$

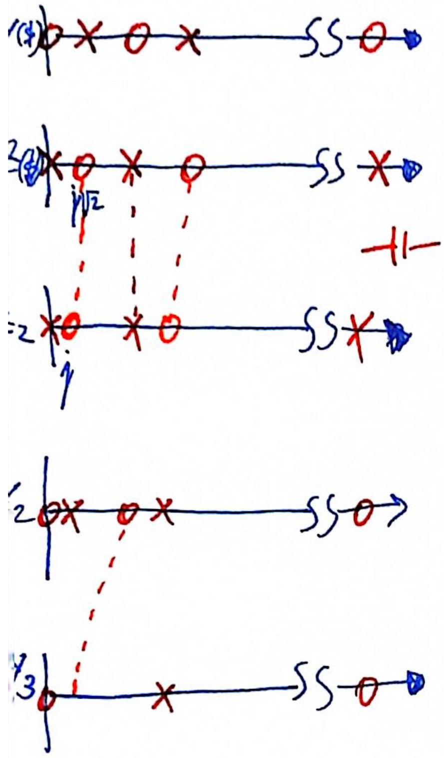


2) $Y(s) = \dfrac{3s(s^2+7/3)}{(s^2+2)(s^2+5)}$

Topología elegida



$Z(s) = \dfrac{(s^2+2)(s^2+5)}{3s(s^2+7/3)}$



Remoción parcial de polo en el origen para que el cero en (s^2+2) se desplace a (s^2+1)

$\cancel{K_0 = \dfrac{(s^2+2)(s^2+5)}{3s(s^2+7/3)}}$

$$\frac{s^4+7s^2+10}{3s(s^2+7/3)} - \frac{K_0}{s}\bigg|_{s^2=-1} = 0 \Rightarrow \frac{s^4+7s^2+10}{3\cancel{s}(s^2+7/3)} = \frac{K_0}{\cancel{s}}$$

$$\frac{(s^2+2)(s^2+5)}{3(s^2+7/3)} = K_0 = \frac{(5-1)(2-1)}{3(7/3-1)} = \frac{4}{3\left(\frac{4}{3}\right)} = 1$$

[redacted]
HOJA 4

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

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

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

$$2K_2 = \lim_{s^2 \to -1} \frac{\cancel{s^2+1}}{\cancel{s}} \; \frac{3(s^2+7/3)\cancel{s}}{(s^2+3)\,(\cancel{s^2+1})} = \frac{3(7/3 - 1)}{(3-1)} = 2$$

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

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