TAREA SEMANAL 11

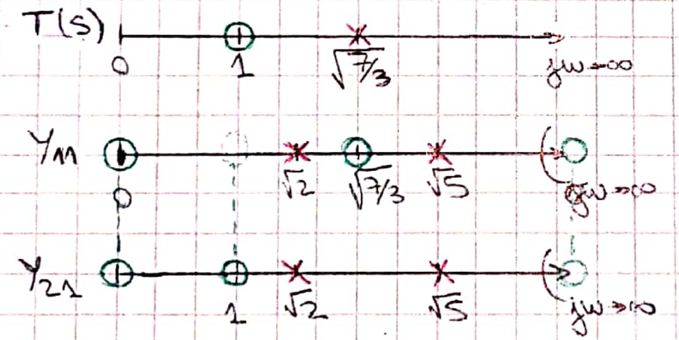
• Síntesis de Funciones Transferencia

① $Y_{11} = \left.\frac{I_1}{V_1}\right|_{V_2=0} = \frac{3s(s^2+7/3)}{(s^2+2)(s^2+5)}$

$T(s) = \frac{Y_{21}}{Y_{11}} = \left.\frac{I_2}{I_1}\right|_{V_2=0} = \frac{(s^2+1)}{3(s^2+7/3)}$

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

a) Síntesis gráfica



} Sintetizo Y_{11}

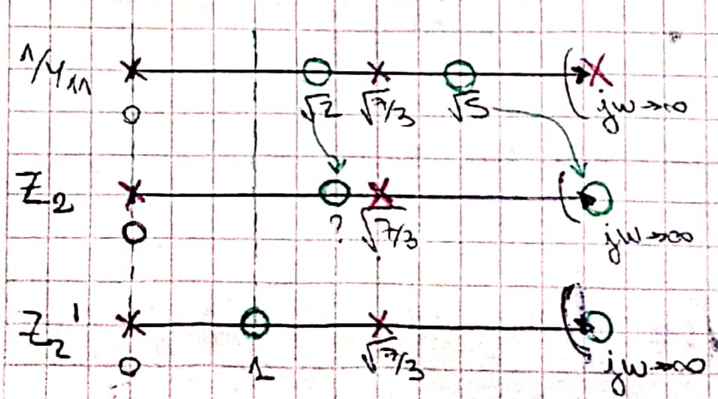
↓

} respeto los ceros de Y_{21} ya que si me baso en T(s) hay un cero que se me simplifica y lo perdería.

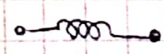
• Debo remover
- $\omega = 0$
- $\omega \to \infty$
- $\omega = 1$

• El primer elemento debe estar en serie ya que sino quedaría en // a un generador de tensión

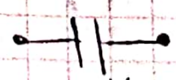
Invierto a $1/Y_{11}$



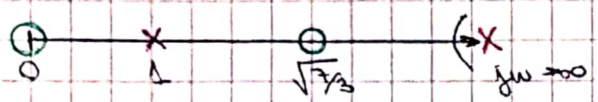
remuevo k_∞

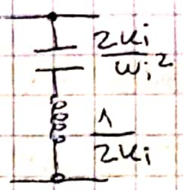


remuevo parcialmente k_0 para llevar un cero a $\omega = 1$



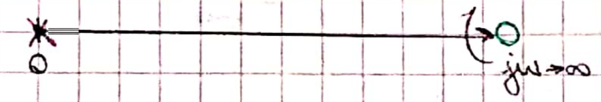
Invierto y remuevo en $w=1$

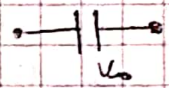
Y_2 

remuevo k_i 

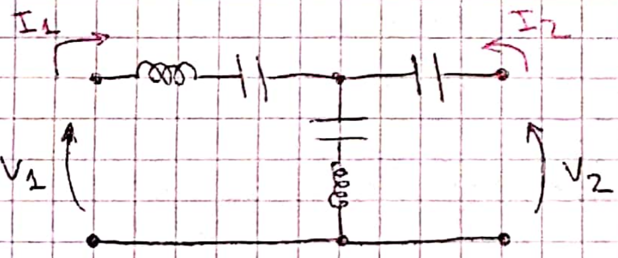
Y_4 

Invierto y remuevo en $w=0$

Z_4 

remuevo k_0 

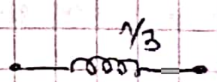
Red sintetizada:



b) Síntesis Analítica

$$Z_0 = \frac{1}{Y_{11}} = \frac{(s^2+2)(s^2+5)}{3s(s^2+7/3)}$$ } remuevo k_∞

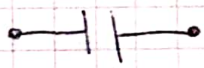
$$k_\infty = \lim_{s\to\infty} \frac{(s^2+2)(s^2+5)}{3s^2(s^2+7/3)} = \frac{1}{3}$$



$$Z_2 = Z_0 - \frac{1}{3}s = \frac{s^4+7s^2+10}{3s(s^2+7/3)} - \frac{\cancel{1}}{\cancel{3}}s\cdot\frac{3s(s^2+7/3)}{3s(s^2+7/3)} = \frac{s^4+7s^2+10-\cancel{s^4}-s^2\,7/\ldots}{\ldots}$$

$$Z_2 = \frac{14/3\,s^2+10}{3s(s^2+7/3)}$$ } remuevo parcialmente en k_0

$$Z_2'\Big|_{s=j1} = Z_2\Big|_{s=j1} - \frac{k_0'}{s}\Big|_{s=j1} = 0 \Rightarrow \frac{-14/3+10}{3\cancel{j}(-1+7/3)} = \frac{k_0'}{\cancel{j}} \to k_0' = \frac{4}{3}$$

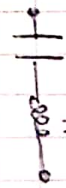


$$Z_2' = \frac{14/3\, s^2 + 10}{3s(s^2+7/3)} - \frac{4}{3s} = \frac{14/3\, s^2 + 10 - 4s^2 - 28/3}{\cdots} = \frac{2/3\, s^2 + 2/3}{3s(s^2+7/3)}$$

$$Z_2' = \frac{2(s^2+1)}{9s(s^2+7/3)}$$ } invierto y remuevo en $w=1$

$$Y_2 = \frac{9s^3+21s}{2(s^2+1)}$$

$$2k_1 = \lim_{s^2\to -1} \frac{\cancel{(s^2+1)}}{\cancel{s}} \cdot \frac{9s^{\cancel{3}\,2}+21\cancel{s}}{2\cancel{(s^2+1)}} = \frac{-9+21}{2} = \boxed{6 = 2k_1} \to$$



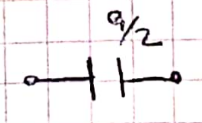
$\frac{2k_1}{w_1^2} = 6$

$\frac{1}{2k_1} = \frac{1}{6}$

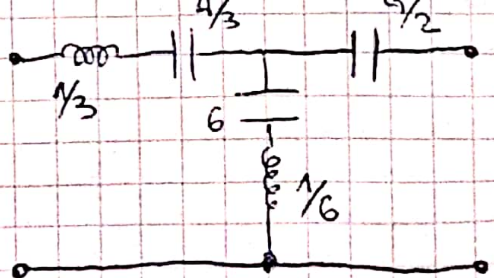
$$Y_4 = \frac{9s^3+21s}{2(s^2+1)} - \frac{6s}{(s^2+1)} = \frac{9s^3+9s}{2(s^2+1)} = \frac{9}{2}\,\frac{s\cancel{(s^2+1)}}{\cancel{(s^2+1)}} = \frac{9}{2}s$$

$Y_4 = \frac{9}{2}s$ } sería un CAP. en paralelo → como la condición de medición es $V_2=0$, no puedo dejarlo como admitancia

$$Z_4 = \frac{2}{9}\cdot\frac{1}{s} = \frac{1}{\frac{9}{2}s}$$

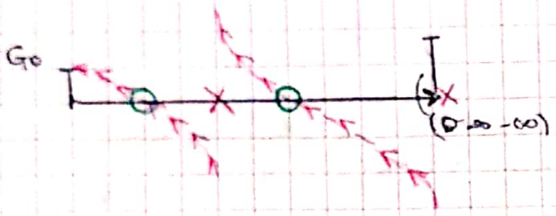


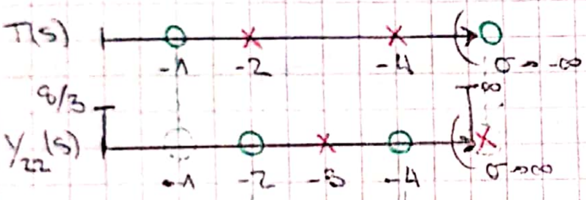
Red Final:



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

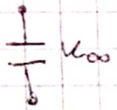
$\frac{Q}{D} = \frac{(s+2)(s+4)}{(s+3)}$ $\Big\}$ lo pienso como Y_{22}

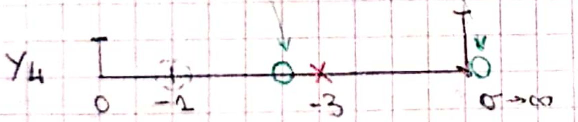




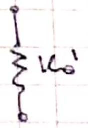
$\Big\}$ Debo lograr ceros en $\begin{cases}\sigma \to -\infty \\ \sigma = -1\end{cases}$

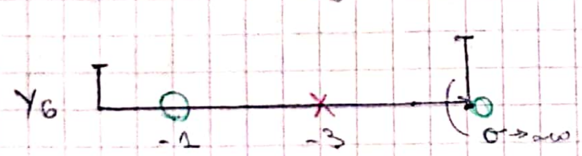
Remuevo K_∞ para lograr el cero en ∞.

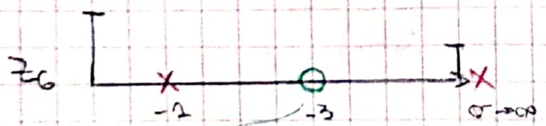




remuevo parcialmente K_0 p/ lograr un cero en -1







remuevo en $\sigma = -1$

remuevo en K_∞