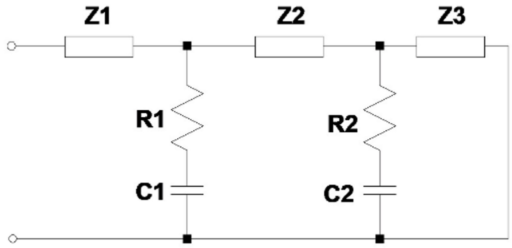
# ES11

domingo, 25 de septiembre de 2022 17:01

**1)** Encuentre el valor de los componentes del siguiente circuito:




Sabiendo que está caracterizado por la siguiente función de excitación y constantes de tiempo:

$$\boxed{R1.C1 = \frac{1}{6}}$$

$$Y_3 = \frac{s K_3}{s + \sigma_3} = \left. \frac{1}{\frac{\cancel{s}}{\cancel{s} K_3} + \frac{\sigma_3}{s K_3}} \right] Z$$

$$R_1 = \frac{1}{K_3} \qquad C_1 = K_3 / \sigma_3$$

$$R_1 . C_1 = \frac{1}{\cancel{K_3}} \cdot \frac{\cancel{K_3}}{\sigma_3} = \frac{1}{6}$$

$$\boxed{\sigma_3 = 6}$$

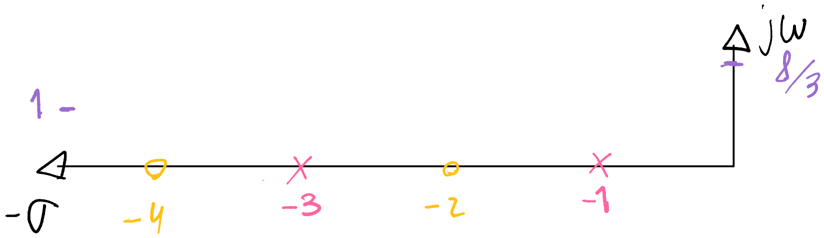
$$R2.C2 = \frac{2}{7} \rightarrow \sigma_7 = \frac{7}{2}$$

$$Z(s) = \frac{(s^2 + 6s + 8)}{(s^2 + 4s + 3)}$$

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

$$\rightarrow \lim_{s \to \infty} Z_{(s)} = 1$$

$$\rightarrow \lim_{s \to 0} Z_{(s)} = \frac{8}{3}$$




$Z(s)$

La rama en derivación me obliga a remover parcialmente. $\rightarrow \sigma_3 = -6$

$$Z(s) - K_\infty' = Z_2(s) = 0 \Big|_{s=-6}$$

$$K_\infty' = Z(-6) = \frac{(-6+2)(-6+4)}{(-6+1)(-6+3)} = \frac{8}{15} = Z1$$

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$$Z_2(s) = \frac{(s+2)(s+4)}{(s+1)(s+3)} - \frac{8}{15} = \frac{(s+2)(s+4).15 - 8.(s+1)(s+3)}{(s+1)(s+3)15}$$

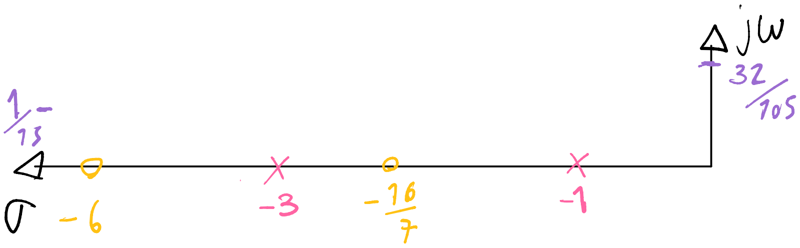
$$Z_2(s) = \frac{15s^2 + 90s + 120 - 8s^2 - 32s - 24}{(s+1)(s+3)15}$$

Removi Bem

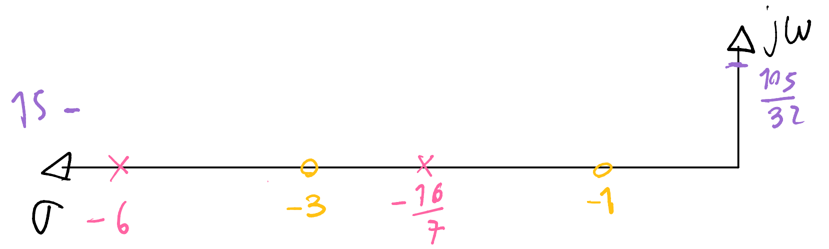
$$Z_2(s) = \frac{7s^2 + 58s + 96}{(s+1)(s+3)15} = \frac{7(s+\frac{16}{7})(s+6)}{(s+1)(s+3).15}$$

L → ∞ → $\frac{1}{15}$

L → 0 → $32/105$



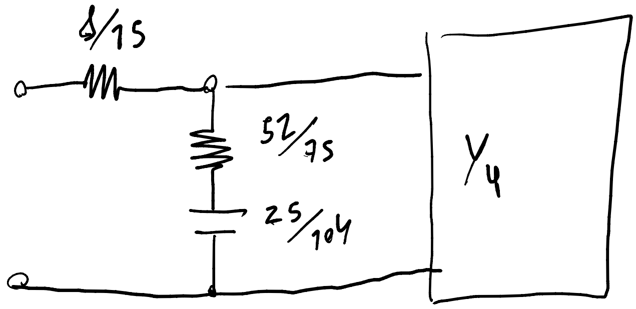

$Z_2(s)$




$Y_2(s)$

→ Remoción Total Polo $\sigma = -6$

→ $$K_3 = \lim_{s \to -6} \frac{(s-6)}{s} \cdot Y_2(s) = \frac{(s+1)(s+3).15}{s(s+\frac{16}{7}).7} = \frac{75}{52}$$

→ 


75

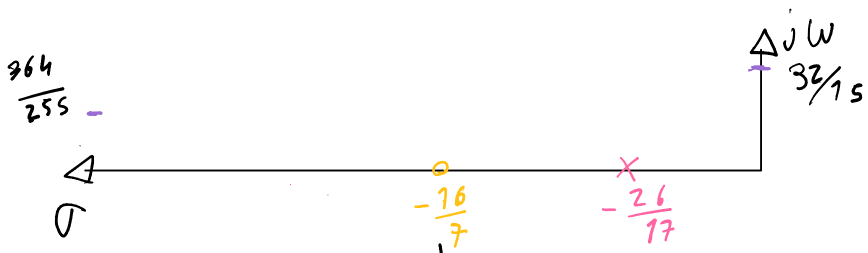
$$Y_4 = Y_2 - Y_3 = \frac{(s+1)(s+3)15}{7(s+6)\left(s+\frac{16}{7}\right)} - \frac{s \cdot \frac{75}{52}}{(s+6)}$$

$$Y_4 = \frac{(s+1)(s+3)15 - s \cdot \frac{75}{52} \cdot 7\left(s+\frac{16}{7}\right)}{(s+6)\left(s+\frac{16}{7}\right)7}$$

$$Y_4 = \frac{15s^2 + 60s + 45 - s^2\frac{525}{52} - s\frac{300}{13}}{(s+6)\left(s+\frac{16}{7}\right).7}$$

$$Y_4 = \frac{s^2\, 255/52 + s\frac{460}{13} + 45}{(s+6)\left(s+\frac{16}{7}\right).7} = \frac{\left(s+\frac{26}{17}\right)\cancel{(s+6)}.\frac{255}{52}}{\cancel{(s+6)}\left(s+16/7\right).7}$$

$$Z_4 = \frac{\left(s+16/7\right).7}{\left(s+\frac{26}{17}\right).\frac{255}{52}} \quad \begin{array}{l} \infty \to \frac{364}{255} \\ 0 \to 32/15 \end{array}$$




$Z_4(s)$

Lo tengo que mover A $\frac{7}{2} = \sigma_7$

$$Z_4(s) - K'_{\infty_2} = Z_6(s) = 0 \Big|_{s=-\frac{7}{2}}$$

$$K'_{\infty_2} = Z_4(s)\Big|_{s=-7/2} = \frac{884}{1005}$$

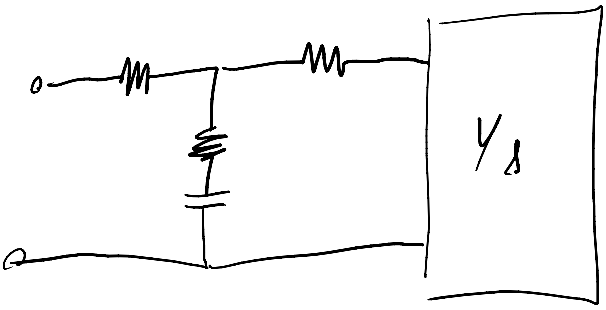
Si Remuevo $K_{\infty_2}$:

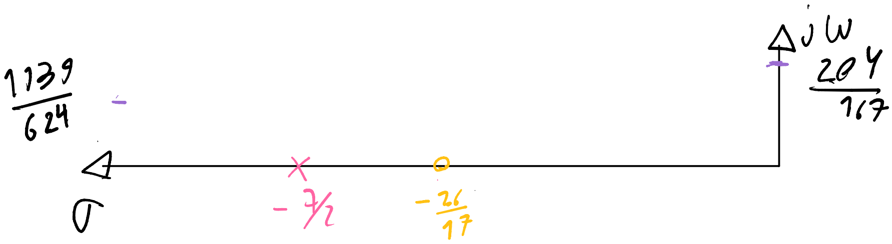
$$Z_4 - \frac{884}{1005} = Z_6$$

$$Z_4 - \frac{884}{1005} = Z_6$$

$$Z_6 = \frac{(s+16/7)7}{\frac{255}{52}(s+\frac{26}{17})} - \frac{884}{1005} = \frac{7035\,s + 16080 - 4335\,s - 6630}{1005\,(s+\frac{26}{17}) \cdot \frac{255}{52}}$$

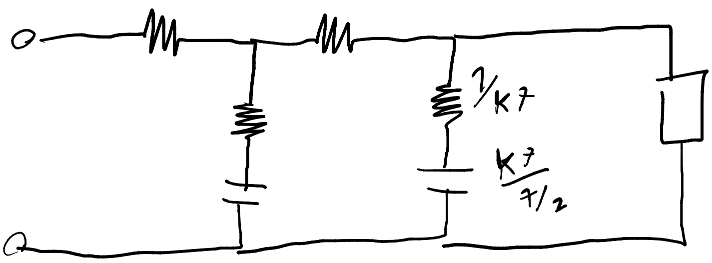
$$Z_6 = \frac{2700\,s + 9450}{1005\,(s+\frac{26}{17})\frac{255}{52}} = \frac{624 \cdot (s+7/2)}{1139 \cdot (s+\frac{26}{17})}$$




$Y_6(s)$

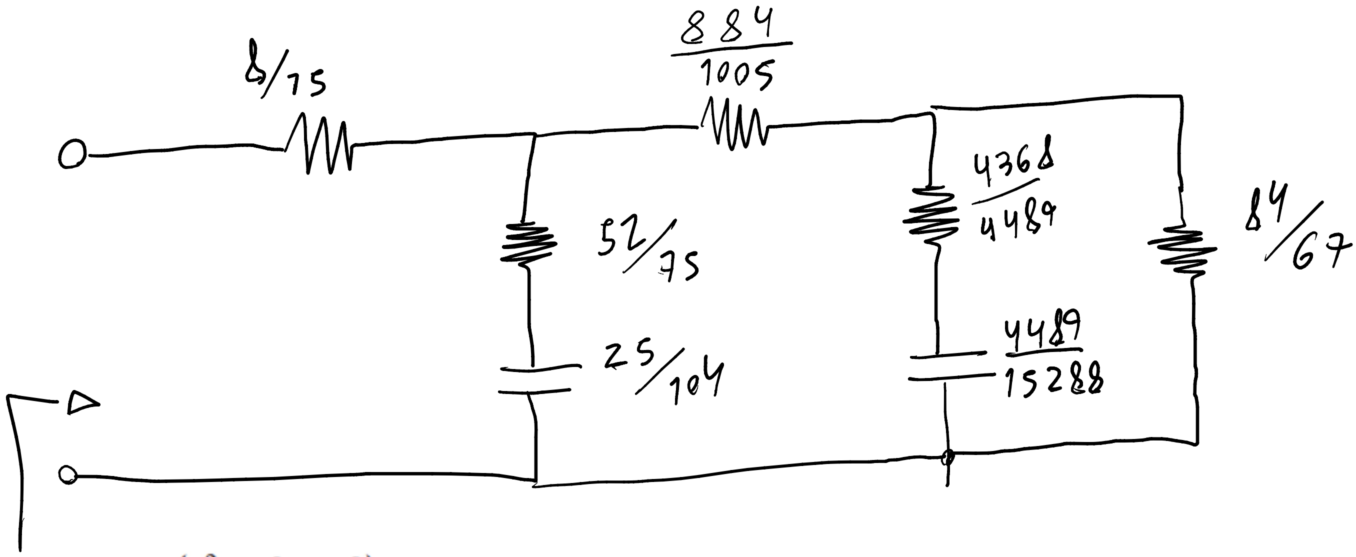
$$K_7 = \lim_{s \to -\frac{7}{2}} \frac{(s+7/2)}{s} \cdot Y_6(s) = \frac{1139\,(s+26/17)}{624\,s} = \boxed{\frac{4489}{4368}}$$




$$\frac{1139 \cdot (s+\frac{26}{17})}{624 \cdot (s+7/2)} = Y_6(s)$$

$$Y_8 = Y_6 - \frac{s\,\frac{4489}{4368}}{(s+7/2)} = \frac{1139\,s + 1742 - s\,\frac{4489}{7}}{624\,(s+7/2)}$$

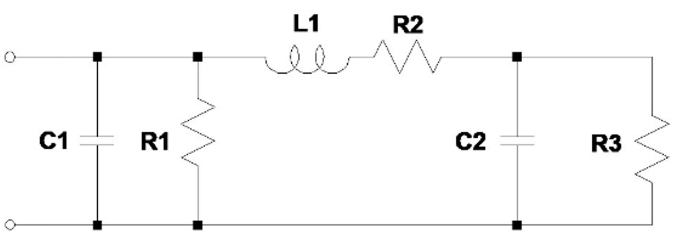
$$Y_1 = \frac{\frac{3484}{7} s + 1742}{624\,(s + 7/2)} = \frac{\frac{3484}{7}\cancel{(s + 7/2)}}{624\cancel{(s + 7/2)}} = \frac{67}{84}$$




$$Z(s) = \frac{(s^2 + 6s + 8)}{(s^2 + 4s + 3)}$$

**2)** Determine el valor de los componentes que integran el siguiente dipolo, sabiendo que satisface la impedancia propuesta:

$$Z(s) = \frac{(s^2 + s + 1)}{(s^2 + 2s + 5)(s + 1)}$$




$$Z(s) \nearrow \lim_{s \to \infty} Z(s) = \frac{s^2}{s^2 \cdot s} \to 0$$

$$Z(s) \searrow \lim_{s \to 0} Z(s) = \frac{1}{5 \cdot 1} = \frac{1}{5} \to K_0$$

La $Z(s)$ es de orden 3 y hay 3 elementos

La $Z(s)$ es de orden 3 y hay 3 elementos reactivos. Por lo que parece una topología canónica y las remociones son totales. Puedo intentar por resolución sistemática.

$$Z(s) = \frac{(s^2+s+1)}{(s^2+2s+5)(s+1)} = \frac{s^2+s+1}{s^3+3s^2+7s+5}$$

$$\begin{array}{l|l}
s^3+3s^2+7s+5 & s^2+s+1 \quad (Y) \\
-\ s^3+s^2+s & s \\
\hline
2s^2+6s+5 &
\end{array}$$

No invierto para obtener

$$\begin{array}{l|l}
2s^2+6s+5 & s^2+s+1 \quad (Y) \\
-\ 2s^2+2s+2 & 2 \quad 1/2 \\
\hline
\end{array}$$

$$\begin{array}{l|l}
s^2+s+1 & 4s+3 \quad (Z) \\
-\ s^2+s\frac{3}{4} & s\frac{1}{4} \\
\hline
s\frac{1}{4}+1 &
\end{array}$$

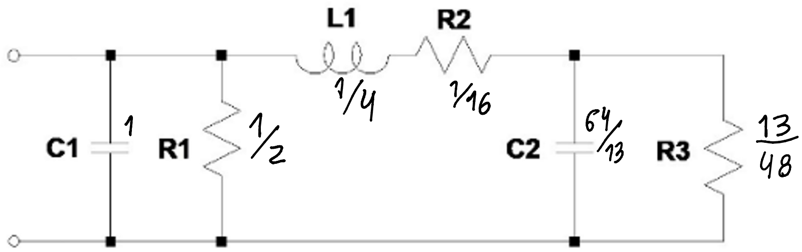
No invierto para obtener

$$\begin{array}{l|l}
s\frac{1}{4}+1 & 4s+3 \quad (Z) \\
-\ s\frac{1}{4}+\frac{3}{16} & \frac{1}{16} \\
\hline
\end{array}$$

$$\begin{array}{l|l}
4s+3 & \frac{13}{16} \quad (Y) \\
-\ 4s & s.\frac{64}{13} \\
\hline
3 &
\end{array}$$

No invierto

$$\begin{array}{l|l}
3 & 13/16 \\
-\ 3 & \frac{48}{13} \\
\hline
0 &
\end{array}$$


L1
R2
1/4
1/16
C1
1
R1
1/2
C2
64/13
R3
13/48