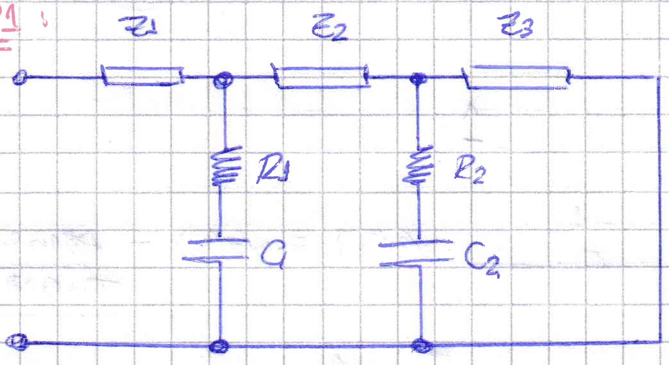
TRABAJO SEMANAL Nº10 (TOMÁS A. ALBANESI)

EJERCICIO Nº1:



$R_1 C_1 = 1/6$

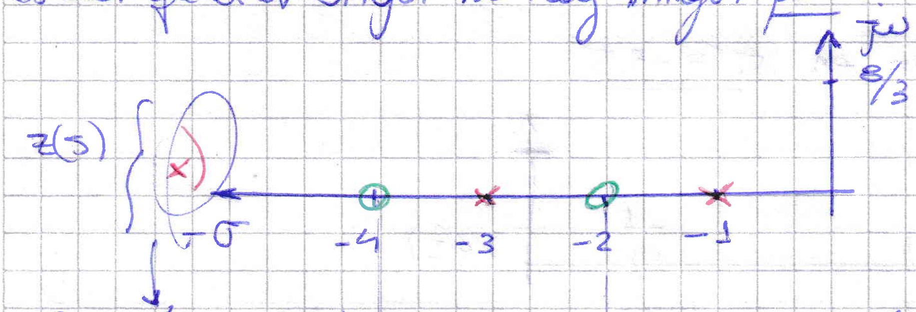
$R_2 C_2 = 2/7$

$$Z(s) = \frac{s^2+6s+8}{s^2+4s+3} = \frac{(s+2)(s+4)}{(s+1)(s+3)}$$

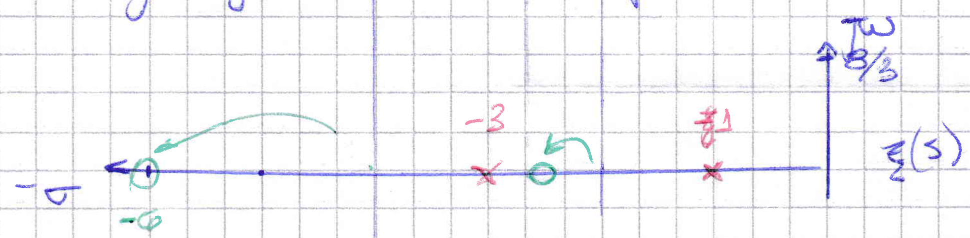
$$K_\infty = \lim_{s\to\infty} Z(s) = 1$$

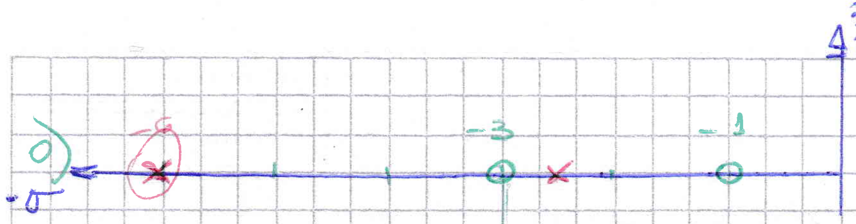
$$K_0 = \lim_{s\to 0} Z(s)\cdot s = \frac{s^3+6s^2+8s}{s^2+4s+3} = \frac{0}{3} = 0$$

es decir que en el origen no hay ningún polo.



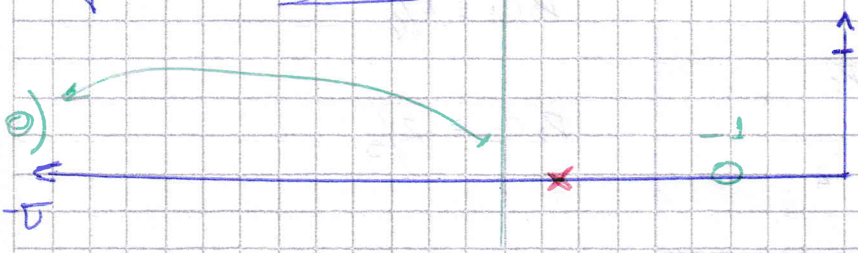
Remoción parcial en ∞ para lograr sacar el cero en (-4), y llevarlo a -6 y luego removemos el tanque R_1C_1.





$Y_2(s) = \frac{1}{Z_2(s)}$

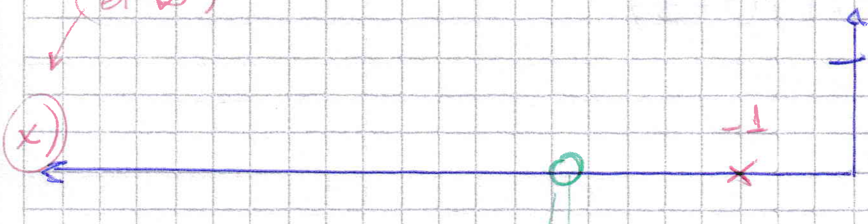
Al invertir $Y_2(s) = \frac{1}{Z_2(s)}$, puedo remover el polo ubicado en -6 como tanque RC en derivación.



$Y_3(s) = Y_2(s) -$ Remoción tanque RC

Invierto $Y_3(s)$ para remover parcialmente nuevamente y aproximar el cero a $\omega^2 = -3{,}5$ que es la frec. de resonancia.

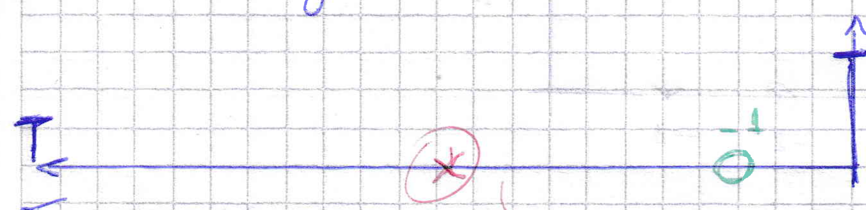
(en ∞)



$Z_3(s) = \frac{1}{Y_3(s)}$

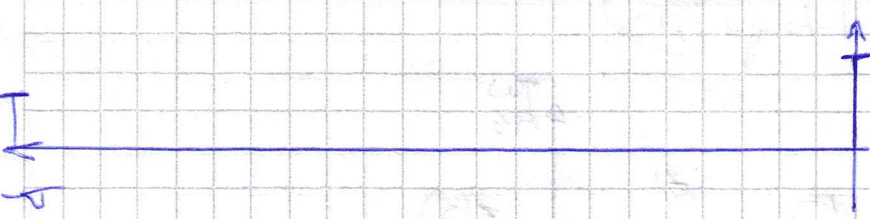
$Z_4(s)$

Invierto $Z_4(s)$ y remuevo en $\sigma = -3{,}5$



$Y_4(s)$

Remoción en TANQUE RC en derivación



NOTA

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* Remoción parcial en (∞) :

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

$$K_\infty' = Z(s)\big|_{s=-6} = \frac{(-6)^2 + 6\cdot(-6) + 8}{(-6)^2 + 4\cdot(-6) + 3}$$

$$\boxed{K_\infty' = \frac{8}{15}} = \{Z(s)\} = \frac{8}{15} \Rightarrow \text{RESISTENCIA EN SERIE } \boxed{R = \frac{8}{15}}$$

* Remoción de polo en $\sigma = -6$:

$$Z_2(s) = Z(s) - K_\infty' = Z(s) - \frac{8}{15} = \frac{s^2 + 6s + 8}{s^2 + 4s + 3} - 8/15$$

$$Z_2(s) = \frac{s^2 + 6s + 8 - 8/15\cdot(s^2 + 4s + 3)}{s^2 + 4s + 3}$$

$$Z(s) = \frac{s^2 - \frac{8}{15}s^2 + 6s - \frac{8\cdot 4}{15}s + 8 - 3\cdot\frac{8}{15}}{s^2 + 4s + 3} = \frac{7/15\cdot s^2 + \frac{45}{15}s + \frac{8}{5}}{s^2 + 4s + 3} \quad //$$

$$Y_2(s) = \frac{s^2 + 4s + 3}{\frac{7}{15}\cdot s^2 + 2s + 5} = \frac{\left(\frac{15}{7}\right)(s+1)(s+3)}{\left(s + \frac{16}{7}\right)(s+6)}$$

$$Y_3(s) = Y_2(s) - \frac{K_1\cdot s}{s+6}$$

$$K_1 = \lim_{s \to -6} \left(\frac{15}{7}\right)\cdot\frac{(s+1)(s+3)}{\left(s+\frac{16}{7}\right)\cancel{(s+6)}}\cdot\frac{\cancel{(s+6)}}{s} = \frac{15}{7}\cdot\frac{(-6+1)(-6+3)}{\left(-6+\frac{16}{7}\right)(-6)}$$

$$\boxed{K_1 = 75/52} = \{Y(s)\} \Rightarrow \boxed{R_1 = \frac{1}{K_1} = \frac{52}{75}} \wedge C_1 = \frac{K_1}{(-6)} \Rightarrow \boxed{C_1 = \frac{25}{104}}$$

* Remoción parcial en ∞ :

$$Z_3(s) = \frac{1}{Y_3(s)}$$

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

$$Y_3(s) = \frac{\frac{15}{7}\cdot(s^2+4s+3) - \frac{75}{52}\cdot\left(s^2+\frac{16}{7}\cdot s\right)}{\left(s+\frac{16}{7}\right)(s+6)}$$

$$Y_3(s) = \frac{\frac{15}{7}\cdot s^2 - \frac{75}{52}\cdot s^2 + \frac{60}{7}\cdot s + \frac{45}{7} - \frac{1200}{364} s}{\left(s+\frac{16}{7}\right)(s+6)}$$

$$Y_3(s) = \frac{\frac{255}{364} s^2 + \frac{480}{91} s + \frac{45}{7}}{\left(s+\frac{16}{7}\right)(s+6)} = \frac{\left(\frac{255}{364}\right)\cdot\left(s^2+\frac{128}{17}s+\frac{156}{17}\right)}{\left(s+\frac{16}{7}\right)(s+6)}$$

$$Y_3(s) = \left(\frac{255}{364}\right) \cdot \frac{(s+26/17)\cancel{(s+6)}}{(s+16/7)\cancel{(s+6)}}$$

$$Z_3(s) = \left(\frac{364}{255}\right) \cdot \frac{(s+16/7)}{(s+26/17)}$$

$$Z_4(s) = Z_3(s) - k_\infty'' \; ; \; k_\infty'' = Z_3(s)\Big|_{s=-3,5} = \left(\frac{364}{255}\right) \cdot \frac{\left(-3,5+\frac{16}{7}\right)}{\left(-3,5+\frac{26}{17}\right)}$$

$$Z_4(s) \rightarrow \boxed{k_\infty'' = 884/1005} \; \hat{=} \; \{Z(s)\} \equiv \boxed{R = \frac{884}{1005}}$$

NOTA

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$$Z4(s) = \left(\frac{364}{255}\right) \cdot \frac{(s+16/7)}{(s+26/17)} - (884/1005)$$

$$Z4(s) = \left(\frac{364}{255}\right) \cdot \frac{\left(s+16/7\right) - \frac{884}{1005}\cdot(s+26/17)}{\left(s+26/17\right)}$$

$$Z4(s) = \frac{\frac{364}{255}\cdot s + \frac{832}{255} - \frac{885}{1005}s - \frac{1352}{1005}}{(s+26/17)}$$

$$Z4(s) = \frac{\frac{624}{1139}s + 1,917971466.}{\left(s+26/17\right)}$$

$$Z4(s) = \frac{(s+3,5)}{\left(s+26/17\right)} \cdot \frac{624}{1139}$$

$$Y4(s) = \frac{1139}{624} \cdot \frac{(s+26/17)}{(s+3,5)}$$

* Remoción de polo en $\sigma = -3,5$:

$$Y5(s) = Y4(s) - \frac{s \cdot k_2}{s+3,5}$$

$$k_2 = \lim_{s \to -3,5} \left(\frac{1139}{624}\right) \cdot \frac{(s+26/17)}{\cancel{(s+3,5)}} \cdot \frac{\cancel{(s+3,5)}}{s} = \left(\frac{1139}{624}\right) \cdot \frac{(-3,5+26/17)}{-3,5}$$

$$\boxed{k_2 = \frac{4489}{4368}} = \{Y(s)\} \Rightarrow R_2 = \frac{1}{k_2} = \boxed{\frac{4368}{4489}} \quad \wedge \quad C_2 = \frac{k_2}{(3,5)}$$

$$\boxed{C_2 = \frac{4489}{15288}}$$

NOTA

$$Y_5(s) = \left(\frac{1139}{625}\right)\frac{(s+26/17)}{(s+3,5)} - \frac{s\,\frac{4439}{4368}}{s+3,5}$$

$$\boxed{Y_5(s) = \frac{67}{84}}$$

Sintetizo la red