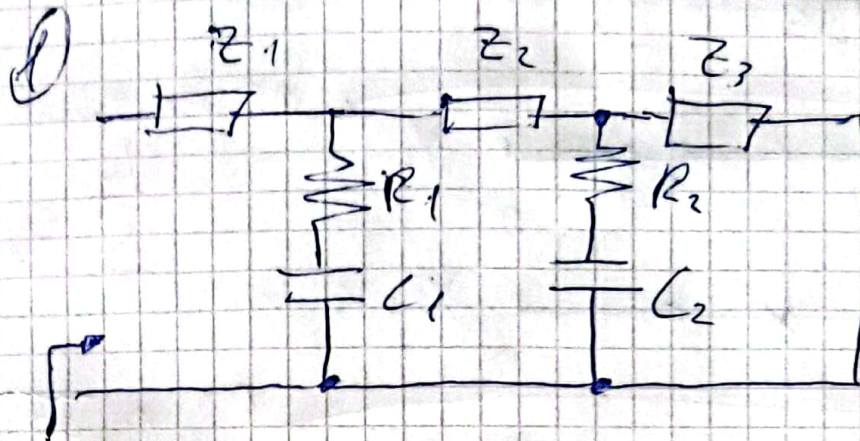Tarea Semanal 11
Síntesis de funciones
Disipativas

①

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

Ctes de tiempo:

$$\tau_1 = R_1 C_1 = \frac{1}{6}$$
$$W_1 = 6$$
$$Z(0) = \frac{8}{3}$$
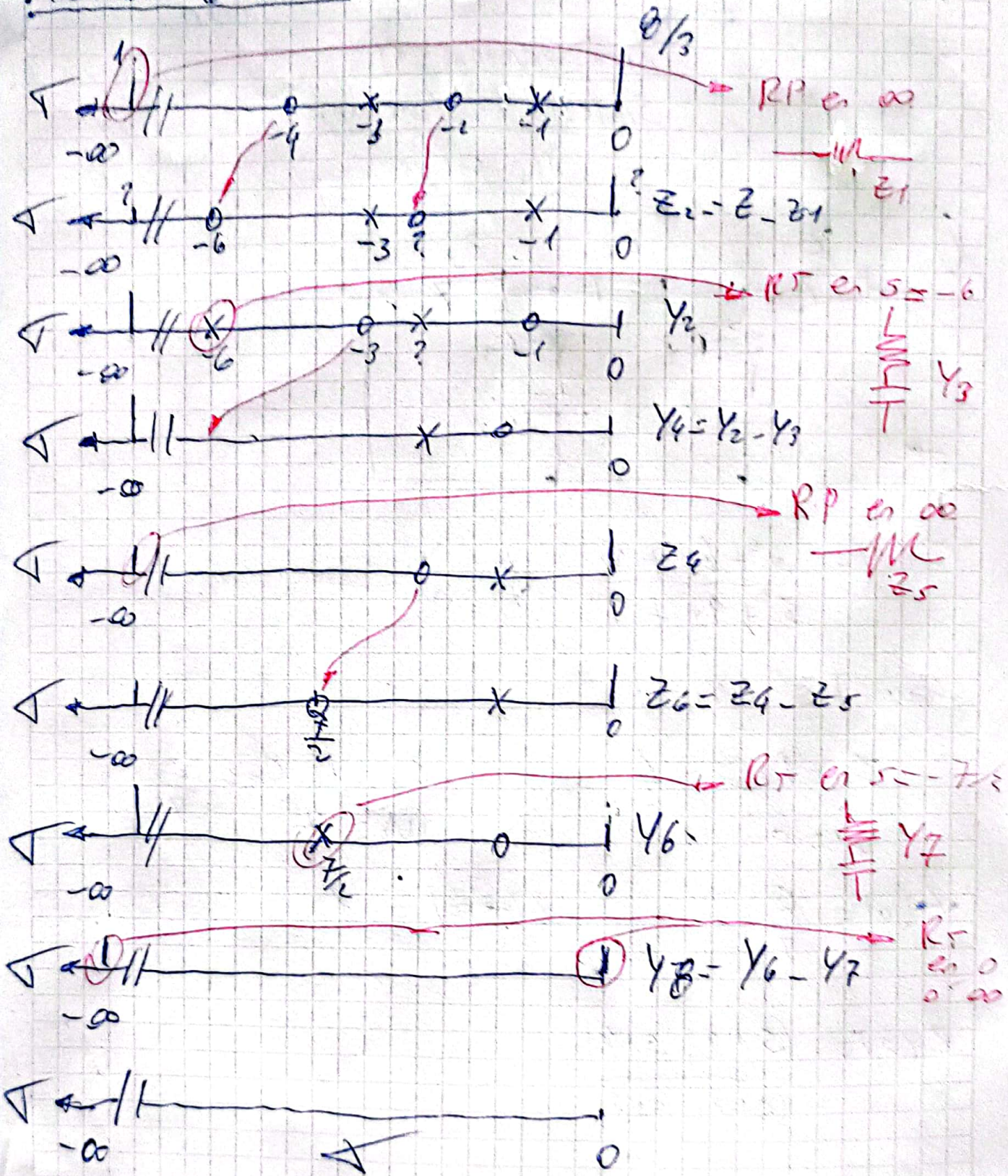
$$\tau_2 = R_2 \cdot C_2 = \frac{2}{7}$$
$$W_2 = \frac{7}{2}$$
$$Z(s = \infty) = 1$$

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

Alternacio de singularidades
Valores finitos en los extremos

Método Gráfico

$\theta/3 \to$ RP en ∞

$-\infty$ ... -4 -3 -2 -1 ... 0 ... $\xrightarrow{}$ Z_1

$Z_2 = Z - Z_1$

$-\infty$ ... -6 ... -3 ... -1 ... 0 $\to$ RP en $S = -6$

Y_2

$-\infty$ ... -6 ... -3 ... -1 ... 0 $\xrightarrow{}$ Y_3

$Y_4 = Y_2 - Y_3$

$-\infty$ ... $\times$ ... 0 ... 0 $\to$ RP en ∞

Z_4

$-\infty$ ... 0 ... $\times$ ... 0 $\xrightarrow{}$ Z_5

$Z_6 = Z_4 - Z_5$

$-\infty$ ... $\frac{7}{2}$ ... $\times$ ... 0 $\to$ RP en $S = -7/2$

Y_6 $\xrightarrow{}$ Y_7

$-\infty$ ... $\frac{7}{2}$ ... 0 ... 0

$Y_8 = Y_6 - Y_7$ $\to$ RP en 0, ∞

$-\infty$ ... 0 ... 0

$-\infty$ ... 0

Calcular

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

- Tengo que remover un valor tal que aparezca un 0 en -6 en Z_2

$$\lim_{s \to -6} Z_2 = \lim_{s \to -6} Z - Z_1 = 0 \implies Z_1 = \lim_{s \to -6} Z$$

$$Z_1 = 8/15 \quad < 1 \checkmark$$

- Remuevo Z_1 de Z (Parcial)

$$Z_2 = \frac{s^2 + 6s + 8 - \frac{8}{15}s^2 - \frac{32}{15}s - \frac{8}{5}}{s^2 + 4s + 3}$$

$$\frac{\frac{8}{15}s}{-\frac{11}{\boxed{-1}}}$$

$$Z_2 = \frac{\frac{7}{15}s^2 + \frac{58}{15}s + \frac{32}{5}}{s^2 + 4s + 3} = \frac{7(s+6)(s+ \overbrace{?}^{16/7})}{15(s+1)(s+3)}$$

• Remoción total de Y_3 en Y_2:

$$K_1 \lim_{s \to -6} \frac{Y_2 \cdot (s+6)}{s}$$

$$K_1 = \lim_{s \to -6} \frac{15}{7} \cdot \frac{(s+1)(s+3)(s+6)}{(s+6)(s+\frac{16}{7})} \cdot \frac{1}{s} = \frac{75}{52}$$

$$Y_4 = Y_2 - Y_3$$

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

$$Y_3 \begin{cases} 0,693\,R \\ 0,241\,F \end{cases}$$

$$Y_4 = \frac{15}{52} \cdot \frac{(7s+26)}{(7s+16)}$$

$$Z_4 = \frac{52}{15} \cdot \frac{(7s+26)}{(7s+26)}$$

• Remoción parcial en ∞ para 0 en $7/2$ a Z_6

$$Z_6 = Z_4 - Z_5 \longrightarrow \lim_{s \to \frac{7}{2}} Z_6 = 0 = Z_4 - Z_5$$

$$Z_5 = \lim_{s \to -\frac{7}{2}} Z_4 = \frac{884/1005}{}$$

$$Z_5 \quad \frac{858}{1005}$$

$$Z_6 = \frac{312}{67} \cdot \frac{(7+2s)}{(17s+26)} =$$

● Renoción total en $7/2$

$$K_2 = \lim_{s \to \frac{7}{2}} \frac{67}{312} \frac{(17s+26)}{2\left(s-5+\frac{7}{2}\right)} \frac{\left(s+\frac{7}{2}\right)}{5} \div$$
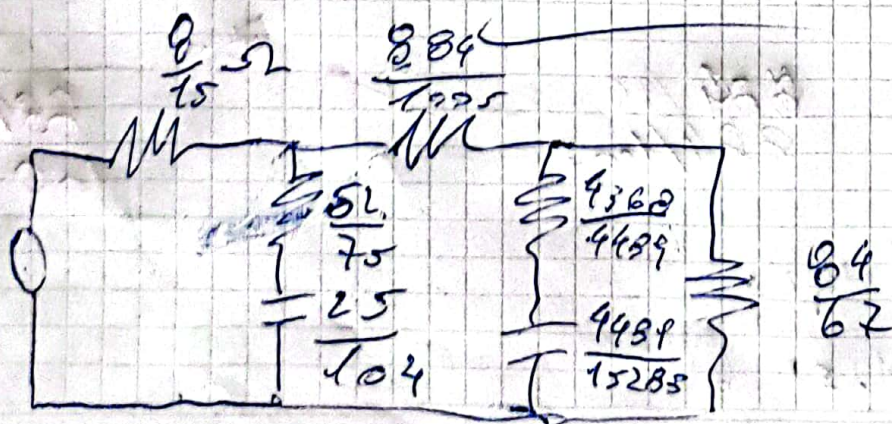
$$K_2 = \frac{4489}{4368}$$

$$Y_8 = Y_6 \sim Y_7$$

$$Y_8 = \frac{67}{312} \frac{(17s+26)}{2\left(s+\frac{7}{2}\right)} - \frac{\frac{4489}{4368} \cdot s}{s+\frac{7}{2}} \quad \leadsto \quad \lessgtr 0.973\Omega \quad \top 0.29 F$$

$$Y_8 = \frac{67}{89} \quad \sim\!\!\sim \quad \frac{84}{67}$$

$$\frac{8}{15}\Omega \quad \frac{884}{T \cdot 995}$$
$$\frac{52}{75}$$
$$\frac{25}{104}$$
$$\frac{4368}{4489}$$
$$\frac{4489}{15285}$$
$$\frac{84}{67}$$

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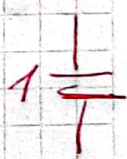
$$Z(s) = \frac{s^2 + s + 1}{(s^2 + 2s + 5)(s+1)}$$

No hay restricciones

• paso 2 Y y extraigo C_1 (RT)

$$Y_2(s) = Y(s) - Y_1(s)$$

$$Y(s) = \frac{(s^2 + 2s + 5)(s+1)}{s^2 + s + 1} \nearrow \quad Y(\infty) = \infty$$

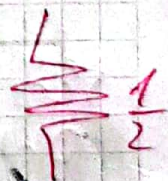$$K_\infty = \lim_{s \to \infty} \frac{Y(s)}{s} = \lim_{s \to \infty} \frac{s^3 + 2s^3 \cdots}{s^3 + s^2 + s \cdots} = 1 \qquad 1 \frac{1}{T}$$

$$Y_2(s) = \frac{s^3 + 3s^2 + 7s + 5}{s^2 + s + 1} - s =$$

$$Y_2 = \frac{2s^2 + 6s + 5}{s^2 + s + 1} \qquad \begin{cases} Y_2(0) = 5 \\ Y_2(\infty) = 2 \end{cases}$$

• Remuevo R_1 (Valor máximo 2)

$$Y_4 = Y_2 - Y_3$$

$$\frac{\frac{L}{s}}{\frac{L}{s}} \frac{1}{2}$$

$$Y_4 = \frac{2s^2 + 6s + 5}{s^2 + s + 1} - 2 = \frac{4s + 3}{s^2 + s + 1}$$

● Paso d Z y remuevo L_1

$$Z_4 = \frac{s^2 + s + 1}{4s + 3}$$

$Z_4(0) = 1/3$

$Z_4(\infty) = \infty$

$$K_\infty = \lim_{s \to \infty} \frac{s^2 + s + 1}{(4s+3)s} = \frac{1}{4}$$

$$Z_6 = Z_4 - Z_5$$

$$Z_6 = \frac{s^2 + s + 1}{4s + 3} - \frac{1}{4}s = \frac{\frac{1}{4}s + 1}{4s + 3}$$

$\frac{1}{4}$

$Z_6(0) = 1/3$

$Z_6(\infty) = 1/16$

● Remuevo R_2 (max $1/16$

$$Z_8 = \frac{\frac{1}{4}s + 1}{4s + 3} - \frac{1}{16} = \frac{13/16}{4s + 3}$$

$1/16$

$\frac{13/16}{4s + 3}$

● Torque final

$$Z_8 = \frac{1}{\frac{64}{13}s + \frac{48}{13}}$$

$\frac{64}{13}$

$\frac{13}{48}$

$1/4$ $1/16$

$\frac{64}{13}$

1 $\frac{1}{2}$ $\frac{13}{48}$