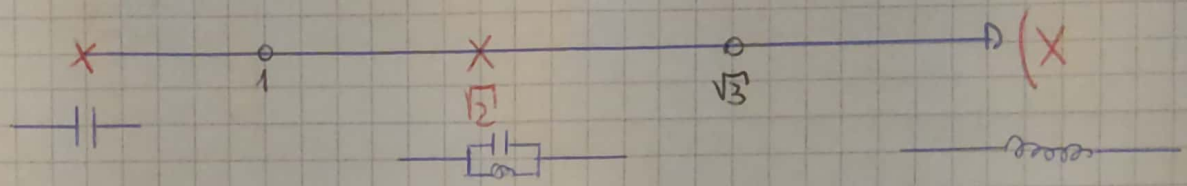
# TAREA SEMANAL 9

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

## POLOS Y CEROS (VERSIÓN SERIE)




$$Z(s) = \frac{s^4+4s^2+3}{s^3+2s} = \frac{K_0}{s} + sK_\infty + \frac{2K_1 s}{s^2+w_1^2}$$

$$2K_1 = \lim_{s^2 \to -w_1^2} \frac{Z(s)}{s}\cdot(s^2+w_1^2) = \lim_{s^2 \to -w_1^2} \frac{(s^2+3)(s^2+1)}{s(s^2+2)}\cdot\frac{(s^2+2)}{s} \Rightarrow 2K_1 = 1/2$$

($s^2 \to -w_1^2$, $-2$)

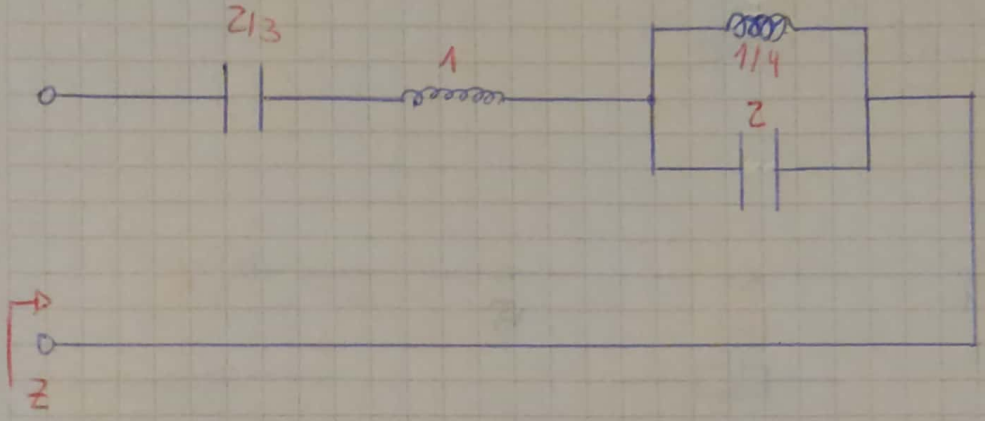
$$K_0 = \lim_{s\to 0} sZ(s) = \lim_{s\to 0} \frac{(s^2+3)(s^2+1)}{s(s^2+2)}\cdot s \Rightarrow K_0 = 3/2$$

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

$$Z(s) = \frac{1}{\frac{1}{K_0}s} + sK_\infty + \frac{2K_1 s}{s^2+2} \rightarrow Z(s) = \frac{1}{\frac{2}{3}s} + \underbrace{s}_{sL} + \frac{1}{\frac{1}{2}s + \frac{1}{\frac{1}{2,2}s}}$$

$\frac{1}{\frac{2}{3}s}$ : $\frac{1}{sC}$

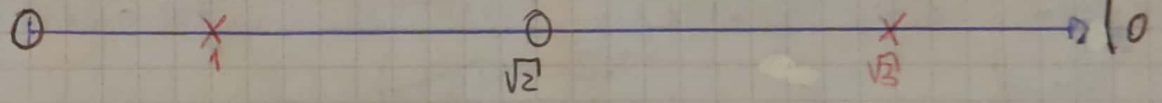
$\frac{1}{\frac{1}{2K_1}s + \frac{1}{K_1 s}}$ : $\underbrace{2s}_{sL} + \frac{1}{sC}$ ; $\frac{1}{4}s$




CIRCUITO SERIE

## POLOS Y CEROS (VERSIÓN PARALELO)

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



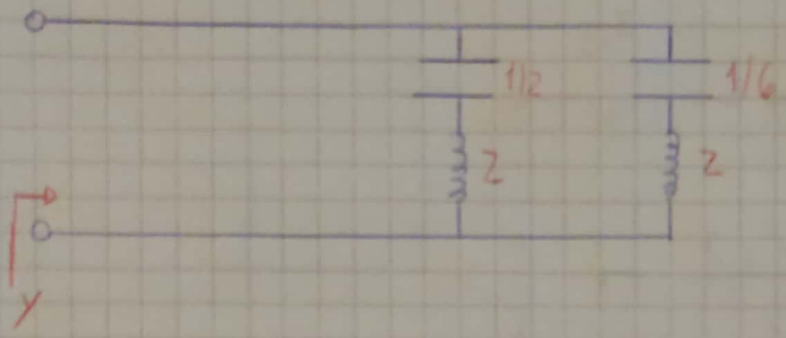

$$Y(s) = \frac{2K_1 s}{s^2+1} + \frac{2K_2 s}{s^2+3}$$

$$2K_1 = \lim_{s^2 \to -1} \frac{s^2+1}{s} \; Y(s) = \lim_{s^2 \to -1} \frac{\cancel{s^2+1}}{\cancel{s}} \cdot \frac{s(s^2+2)}{(s^2+3)(\cancel{s^2+1})} \rightarrow 2K_1 = 1/2$$

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

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

$2s$ → $sL$ ; $\frac{1}{2}s$ → $1/sC$ ; $2s$ → $sL$ ; $\frac{1}{6}s$ → $1/sC$




CIRCUITO PARALELO

b) CAUER 1 Y 2

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

FORMA 1:

$s^4+4s^2+3 \;|\; s^3+2s$ → $s$ → 1

$s^4+2s^2$

$2s^2+3$

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

$-s^3-\frac{3}{2}s$

$\frac{1}{2}s$

$2s^2+3 \;|\; \frac{1}{2}s$ → $4s$ → 4

$-2s^2$

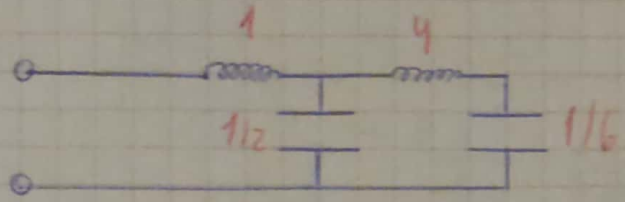
$3$

$\frac{1}{2}s \;|\; 3$ → $\frac{1}{6}s$ → $1/6$

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

$0$

CIRCUITO:




IMPLEMENTACIÓN N°1

OTRA FORMA:

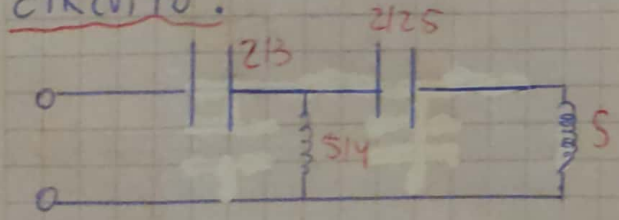
$$3 + 4s^2 + s^4 \;\big|\; 2s + s^3$$
$$-\;\underline{3 + \tfrac{3}{2}s^2 \quad \tfrac{3}{2}\cdot\tfrac{1}{s}} \rightarrow 2/3$$
$$\tfrac{5}{2}s^2 + s^4$$

$$2s + s^3 \;\big|\; \tfrac{5}{2}s^2 + s^4$$
$$-\;\underline{2s + \tfrac{4}{5}s^3 \quad \tfrac{4}{5}\cdot\tfrac{1}{5}} \rightarrow 5/4$$
$$1/5\, s^3$$

$$\tfrac{5}{2}s^2 + s^4 \;\big|\; 1/5\, s^3$$
$$-\;\underline{\tfrac{5}{2}s^2 \quad 25/2 \cdot 1/5} \rightarrow 2/25$$
$$s^4$$

$$1/5\, s^3 \;\big|\; s^4$$
$$-\;\underline{1/5\, s^3 \quad 1/5\, s^{-1}} \rightarrow 5$$
$$0/$$

CIRCUITO:




IMPLEMENTACIÓN N°2