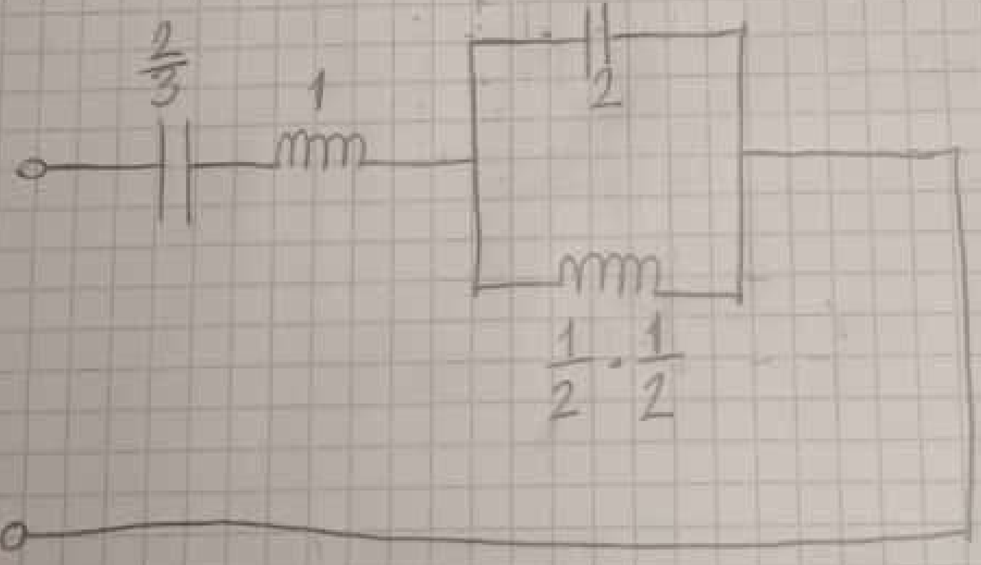
1) $F(s) = \dfrac{s^4 + 4s^2 + 3}{s(s^2+2)}$

a) $K_\phi = \lim_{s \to 0} sF(s) = \dfrac{3}{2}$

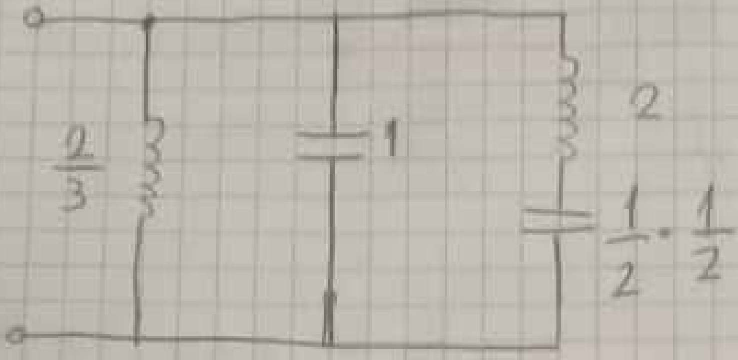
$K_\infty = \lim_{s \to \infty} \dfrac{F(s)}{s} = 1$

$2K_1 = \lim_{s^2 \to -\omega_1^2} F(s) \cdot \dfrac{(s^2+\omega_1^2)}{s}$ $\qquad \omega_1^2 = 2$

$2K_1 = \lim_{s^2 \to -2} \dfrac{s^4+4s^2+3}{s^2} = \dfrac{1}{2}$



b)



c)

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

$s^4 + 4s^2 + 3 \quad | \; s^3 + 2s$

$s^4 + 2s^2 + 0 \qquad 1 \cdot s$

$s^3 + 2 \cdot s \quad | \; 2s^2 + 3$

$s^3 + \frac{3}{2} s \qquad \frac{1}{2} s$

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

$2s^2 \qquad 4s$

$\frac{1}{2} s \quad | \; 3$

$\frac{1}{2} s \qquad \frac{1}{6} s$

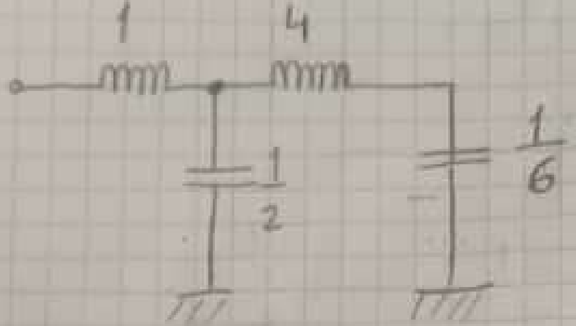
0

1

$\frac{1}{2}$

4

$\frac{1}{6}$

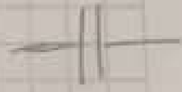


d)

$3+4s^2+s^4 \;\big|\; 2s+s^3$

$\frac{3}{2}+\frac{3}{2}s^2 \qquad \frac{3}{2}\frac{1}{s}$

2/3



$2s+s^3 \;\big|\; \frac{5}{2}s^2+s^4$

$2s+\frac{4}{5}s^3 \qquad \frac{4}{5}\frac{1}{s}$

$\frac{5}{2}s^2+s^4 \;\big|\; \frac{1}{5}s^3$

$\frac{5}{2}s^2 \qquad \frac{25}{2}\frac{1}{s}$

$\frac{5}{4}$

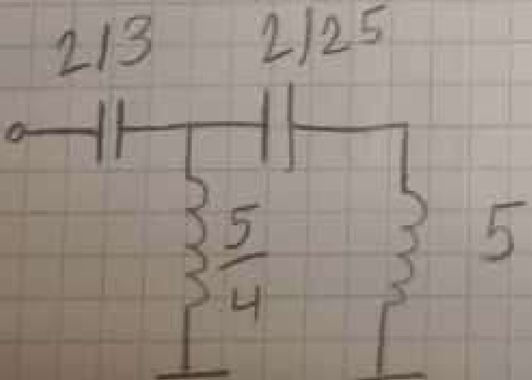
2/25

$\frac{1}{5}s^3 \;\big|\; s^4$

$\frac{1}{5}s^3 \qquad \frac{1}{5}\frac{1}{s}$

0

5



2)

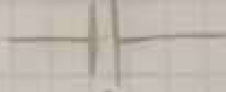
$$Y(s) = \frac{s^5 + 18s^3 + 48s}{6s^4 + 42s^2 + 48}$$

$$Z(s) = \frac{6s^4 + 42s^2 + 48}{s^5 + 18s^3 + 48s}$$

Remoción de 0

$$48 + 42s^2 + 6s^4 \;\big|\; \underline{48s + 18s^3 + s^5}$$

$$\underline{48 + 18s^2 + s^4} \quad \frac{1}{s}$$



$C_1 = 1$

$$48 + 18s^3 + s^5 \;\big|\; \underline{24s^2 + 5s^4}$$

$$\underline{48 + 10s^3} \quad \frac{2}{s}$$

$$8s^3 + s^5$$

$\frac{1}{2} = L_1$

$$F(s) = \frac{1}{s} + \frac{24s^2 + 5s^4}{48s + 18s^3 + s^5} = \frac{1}{s} + \cfrac{1}{\cfrac{48s + 18s^3 + s^5}{24s^2 + 5s^4}}$$

$$F(s) = \frac{1}{s} + \cfrac{1}{\cfrac{2}{s} + \cfrac{8s^3 + s^5}{24s^2 + 5s^4}} = \frac{1}{s} + \cfrac{1}{\cfrac{2}{s} + \cfrac{1}{\cfrac{24s^2 + 5s^4}{8s^3 + s^5}}}$$

F3

$$F_3(s) = Z_3(s) = \frac{5s^4+24s^2}{s^5+8s^3} = \frac{s^2(5s^2+24)}{s^3(s^2+8)}$$

$$F_3(s) = \frac{5s^2+24}{s(s^2+8)}$$

$$K_0 = \lim_{s\to 0} s \cdot F_3 = 24$$

$$K_\infty = \lim_{s\to\infty} \frac{F_3(s)}{s} = 0$$

$$2K_1 = \lim_{s^2\to -8} F_3(s)\frac{(s^2+8)}{s} = \frac{5s^2+24}{s^2} = 2$$