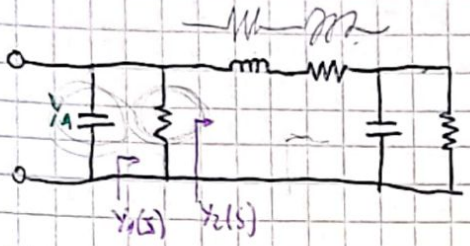
## Ejercicio 2




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

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

$$Y_1(s) = Y(s)_{\infty} = k_\infty s \quad ; \quad k_\infty = \lim_{s\to\infty} \frac{Y(s)}{s} = 1$$

$$Y_1(s) = \frac{s^3+3s^2+7s+5}{s^2+s+1} - s = \frac{2s^2+6s+5}{s^2+s+1} \quad ; \quad Y_1(0) = 5 \quad ; \quad Y_1(\infty) = 2$$

$$Y_2(s) = Y_1(s) - k_V \quad ; \quad \lim_{s\to\infty} Y_2(s) = 0 \Rightarrow k_V = \lim_{s\to\infty} Y_1(s) = 2$$

$$Y_2(s) = \frac{2s^2+6s+5}{s^2+s+1} - 2 = \frac{4s+3}{s^2+s+1} \Rightarrow Z_2(s) = \frac{s^2+s+1}{4s+3}$$

$$Z_3(s) = Z_2(s) - s k_\infty' \quad ; \quad k_\infty' = \lim_{s\to\infty} \frac{Z_2(s)}{s} = \frac{1}{4}$$

$$Z_3(s) = \frac{s^2+s+1}{4s+3} - \frac{1}{4}s = \frac{1/4\,s+1}{4s+3} = \frac{s+4}{s+3/4} \cdot \frac{1}{16}$$

$$Z_3(\infty) = 1/3 \quad \wedge \quad Z_3(s) = 1/16 \Rightarrow Z_4(s) = Z_3(s) - k_\infty \quad ; \quad k_\infty = \lim_{s\to\infty} Z_3(s) = 1/16$$

$$Z_4(s) = \frac{1}{16}\cdot\left(\frac{s+4}{s+3/4} - 1\right) = \frac{1}{16}\cdot\frac{13/4}{s+3/4} = \frac{13}{64}\,\frac{1}{s+3/4} \Rightarrow Y_4(s) = \frac{64}{13}s + \frac{48}{13}$$

$$Y_4(s) = \frac{64}{13}\cdot s + \frac{48}{13}$$