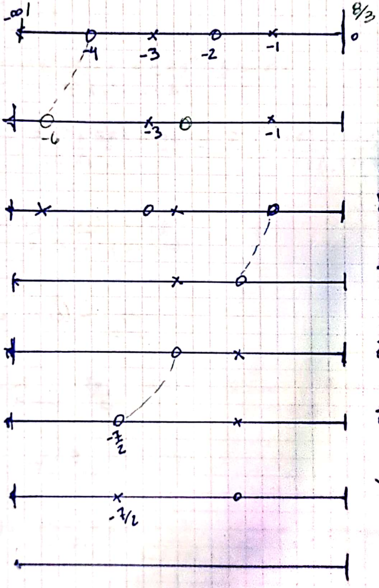
1)

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



$Z(s)$
Remuevo una R en serie para colocar el cero en -6.

$Z_2(s)$

remuevo el polo de admitancia en -6

$Y_2(s)$

. . . .

$Y_4(s)$.

Remuevo en continua para colocar el cero en $-7/2$

$Z_4(s)$

$Z_6(s)$

Remuevo el polo de admitancia en $-\frac{7}{2}$

$Y_6(s)$

$Y_8(s)$

me queda una R . . . .

$$Z_2(s) = Z(s) - Z(-6)$$

$$Z(-6) = \frac{8}{15}$$

$$Z_2(s) = \frac{15s^2 + 90s + 120 - 8s^2 - 32s - 24}{15\,(s^2 + 4s + 3)}$$

$$Z_2(s) = \frac{7s^2 + 58s + 96}{15.(s^2 + 4s + 3)} = \frac{7.(s+6).(s+2,28)}{15.(s+1).(s+3)}$$

$$Y_2(s) = \frac{15.(s+1).(s+3)}{7.(s+6)\,(s+2,28)}$$

$$Y_4(s) = Y_2(s) - \frac{sK_1}{s+6}$$

$$K_1 = \lim_{s \to -6} \frac{Y_2(s)}{s}.(s+6) = \lim_{s \to -6} \frac{15.(s+1).(s+3)}{s\,7.\cancel{(s+6)}(s+2,28)}\,\cancel{(s+6)}$$

$$K_1 = \frac{225}{156,24} = 1,44$$

$$Y_4(s) = \frac{15s^2 + 60s + 45}{7.(s+6)\,(s+2,28)} - \frac{1,44.s}{(s+6)} = \frac{15s^2 + 60s + 45 - 10,08s^2 - 22,98s}{7.(s+6)\,(s+2,28)}$$

$$Y_4(s) = \frac{5s^2 + 37s + 45}{7.(s+6).(s+2,28)} = \frac{5.(s+1,53).\cancel{(s+6)}}{7.\cancel{(s+6)}.(s+2,28)}$$

$$Y_4(s) = \frac{5}{7}\,\frac{(s+1,53)}{(s+2,28)}$$

$$Z_4(s) = \frac{7.(s+2,28)}{5.(s+1,53)}$$

$$Z_6(s) = Z_4(s) - Z_4\left(-\frac{7}{2}\right)$$

$$Z_4\left(-\frac{7}{2}\right) = \frac{-8,54}{-9,85} = 0,867.$$

$$Z_6(s) = \frac{7s+16}{5.(s+1,53)} - 0,867.$$

$$Z_6(s) = \frac{7s+16-4,335s-6,63255}{5(s+1,53)}$$

$$Z_6(s) = \frac{2,665s-9,36747}{5.(s+1,53)} = \frac{2,66\ (s+7/2)}{5.\ (s+1,53)}$$

$$Y_6(s) = \frac{5.\ (s+1,53)}{2,66\ (s+\frac{7}{2})}.$$

$$Y_8(s) = Y_6(s) - \frac{K_2 s}{s+\frac{7}{2}}.$$

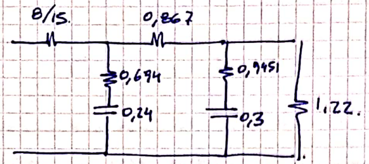
$$K_2 = \lim_{s \to -\frac{7}{2}} \frac{Y_6(s)}{s} \cdot \left(s+\frac{7}{2}\right) = \lim_{s \to -\frac{7}{2}} \frac{5.(s+1,53)}{2,66.\cancel{(s+\frac{7}{2})}} \frac{\cancel{(s+\frac{7}{2})}}{s}$$

$$K_2 = \frac{-9,85}{-9,31} = 1,058$$

$$Y_8(s) = \frac{5.(s+1,53)}{2,66(s+\frac{7}{2})} - \frac{s.1,058}{(s+\frac{7}{2})} = \frac{5s+7,65-2,81428s}{2,66\ (s+\frac{7}{2})}$$

$$Y_8(s) = \frac{2,18572s+7,65}{2,66.(s+\frac{7}{2})} = \frac{2,18572.\ \cancel{(s+7/2)}}{2,66.\ \cancel{(s+\frac{7}{2})}} = 0,821$$

$$Z_8(s) = 1,22$$



con k_1 buscamos el valor de R_1 y C_1

$k_1 = 1/R_1 = 0,694$

$C_1 \cdot R_1 = \frac{1}{6} \Rightarrow C_1 = 0,24$

con k_2 buscamos el valor de R_2 y C_2

$k_2 = 1/R_2 = 0,9451$

$C_2 R_2 = \frac{2}{7} \Rightarrow C_2 = 0,3$

En extremos de frec si $S=0$

$Z_{in} = \frac{8}{15} + 0,867 + 1,22 = 2,62$ ✓

si $S \to \infty$

$Z_{in} = \frac{8}{15} + [[(1,22 \parallel 0,9451) + 0,867] \parallel 0,694] \approx 1$ ✓

2)

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

Como tengo que remover un capacitor y un resistor en derivación lo paso a admitancia

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

$$Y_2(s) = Y(s) - s K_\infty$$

$$K_\infty = \lim_{s\to\infty} \frac{Y(s)}{s} = \lim_{s\to\infty} \frac{(s^2+2s+5)(s+1)}{s^3+5s+1} = \boxed{1}$$

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

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

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

$$Y_2(s) = \frac{2s^2+6s+5}{s^2+s+1}$$

Remuevo el valor de continua 5

$$Y_4(s) = Y_2(s) - Y_2(0)^{/5}$$

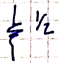
$$Y_4(s) = \frac{2s^2+6s+5}{s^2+s+1} - 5 = \frac{2s^2+6s+5-5s^2-5s-5}{s^2+s+1}$$

No queda FRP. Lo máximo que puedo quitar es 2

HOJA N°

FECHA

$$Y_4(s) = Y_2(s) - 2.$$



$$Y_4(s) = \frac{2s^2+6s+5}{s^2+s+1} - 2 = \frac{\cancel{2s^2}+6s+5-\cancel{2s^2}-2s-2}{s^2+s+1}$$

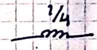
$$Y_4(s) = \frac{4s+3}{s^2+s+1}$$

Paso 3 para quitar el inductor y el resistor en serie

Remuevo 1° el inductor

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

$$Z_C(s) = \frac{s^2+s+1}{4(s+\frac{3}{4})} - sK_\infty'$$



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

$$Z_C(s) = \frac{s^2+s+1}{4(s+\frac{3}{4})} - \frac{s}{4} = \frac{\cancel{s^2}+s+1-\cancel{s^2}-\frac{3}{4}s}{4(s+\frac{3}{4})}$$

$$Z_C(s) = \frac{\frac{1}{4}s+1}{4.(s+\frac{3}{4})}$$

$$Z_C(0) = \frac{1}{3}$$

Remuevo el resistor

$$Z_B(s) = Z_C(s) - Z_C(0) = \frac{\frac{1}{4}s+1}{4.(s+\frac{3}{4})} - \frac{1}{3} = \frac{\frac{3}{4}s+3-4s-3}{12(s+\frac{3}{4})}$$

No es FRP por lo tanto lo máximo que puedo sacarle es $\frac{1}{16}$ dado que $\frac{K.s}{4} - 4s = 0$ $\quad s.(\frac{K}{4}-4) = 0$

$$K = 16$$

NOTA

$$Z_8(s) = Z_6(s) - \frac{1}{16}$$

$$Z_8(s) = \frac{\frac{1}{4}s+1}{4.(s+\frac{3}{4})} - \frac{1}{16} = \frac{\cancel{s}+4-\cancel{s}-\frac{3}{4}}{16.(s+\frac{3}{4})} = \frac{13}{64(s+\frac{3}{4})}$$

$$Y_8(s) = \frac{64(s+\frac{3}{4})}{13} = \frac{64s}{13} + \frac{48}{13}$$

Red