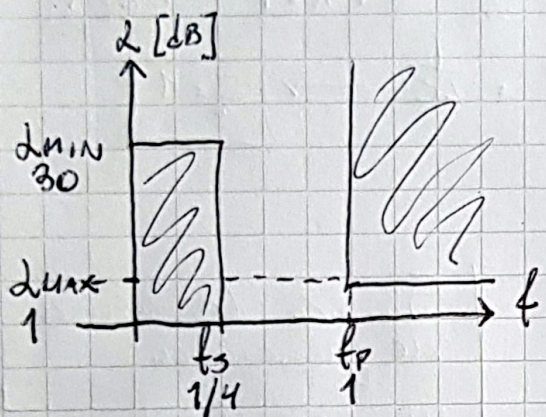
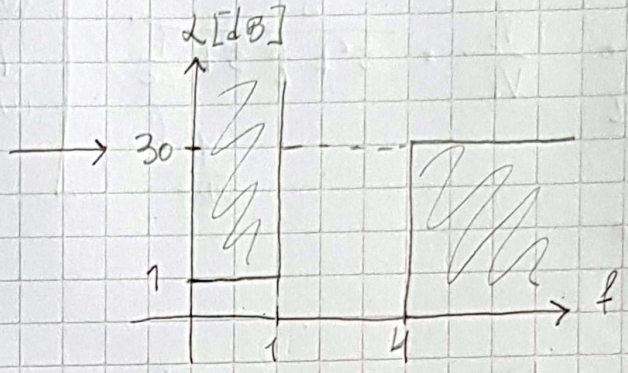
Tarea Semanal 4

$\alpha_{max} = 1\,dB$; $\alpha_{MIN} = 30\,dB$; $f_p = 40\,kHz$; $f_s = 10\,kHz$



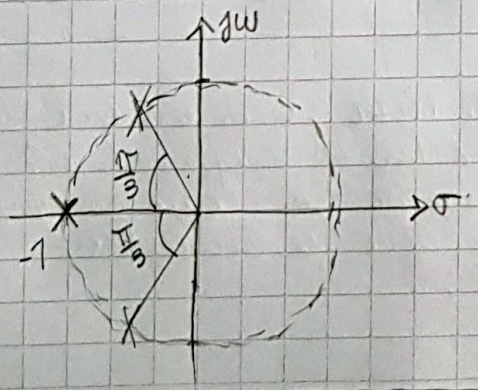


$$\varepsilon^2 = 10^{\frac{\alpha_{max}}{10}} - 1 \Rightarrow \varepsilon^2 = 0{,}259 \rightarrow \boxed{\varepsilon = 0{,}509}$$

Orden $\rightarrow$ $10 \log(1 + \varepsilon^2 \cdot \Omega_s^{2n}) > 30\,dB \rightarrow \boxed{n = 3}$ Cumple

Se define $\Omega_s = 2 \cdot \pi \cdot f_p \cdot \varepsilon^{\frac{1}{n}} \Rightarrow \Omega_B = 200\,668 \frac{rad}{s}$

Se plantea un <u>pasabajo Butterworth</u> de orden 3:



$$T(\$) = \frac{1}{\$ + 1} \cdot \frac{1}{\$^2 + \$ \cdot 2\cos\left(\frac{\pi}{3}\right) + 1}$$

Transformación pa-altas

$$T(s) = T(\$)\Big|_{\$ = \frac{1}{s}} = \frac{1}{\frac{1}{s} + 1} \cdot \frac{1}{\frac{1}{s^2} + \frac{1}{s} 2\cos\left(\frac{\pi}{3}\right) + 1}$$

$$\boxed{T(s) = \frac{s}{s + 1} \cdot \frac{s^2}{s^2 + s \cdot \underbrace{2\cos\left(\frac{\pi}{3}\right)}_{1} + 1}}$$