⑥ Normalización por Butterworth

$$|T(j\omega)|^2 = \frac{1}{1+\varepsilon^2\omega^{2n}} \Rightarrow |Tj\omega|^2 = \frac{1}{1+\omega_N^{2n}}$$

Norma: $\omega_B = \omega_p \varepsilon^{\frac{-1}{n}} = 2\pi \cdot 1500\,Hz \cdot (0,5)^{-\frac{1}{3}}$

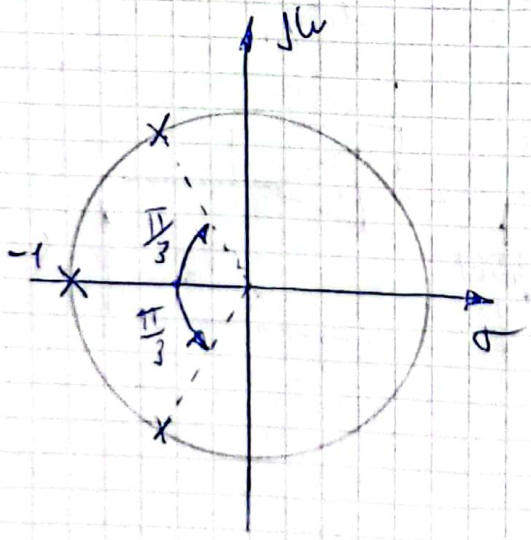
$$\omega_B = 11,874\ \frac{Krad}{s}$$

$$T(s) = \frac{1}{(s+1)(s^2+as+1)}$$

Por tabla de Butter(Q): $a = 1$

$$T(s) = \frac{1}{s^3 + \underset{b}{2}s^2 + \underset{c}{2}s + 1}$$

Diagrama de polos y ceros:



$$a = 2\cos\frac{\pi}{3} = 1$$

polos: $\{-1;\ -\frac{1}{2} \pm \frac{\sqrt{3}}{2}\}$