Polos del sistema de segundo orden(general):

$$s^2 + 2\xi\omega_n s + \omega_n^2 = 0$$

$$s_{1,2} = \frac{-2\xi\omega_n \pm \sqrt{(2\xi\omega_n)^2 - 4\omega_n^2}}{2}$$

$$s_{1,2} = \frac{-2\xi\omega_n \pm \sqrt{4\xi^2\omega_n^2 - 4\omega_n^2}}{2}$$

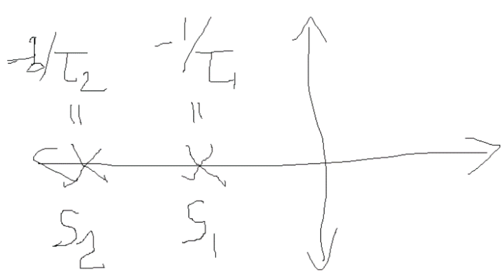
$$s_{1,2} = \frac{-2\xi\omega_n \pm \sqrt{4\omega_n^2(\xi^2 - 1)}}{2}$$

$$s_{1,2} = \frac{-2\xi\omega_n \pm 2\omega_n\sqrt{\xi^2 - 1}}{2}$$

$$s_{1,2} = -\xi\omega_n \pm \omega_n\sqrt{\xi^2 - 1}$$

$$s_{1,2} = \omega_n\left(-\xi \pm \sqrt{\xi^2 - 1}\right)$$

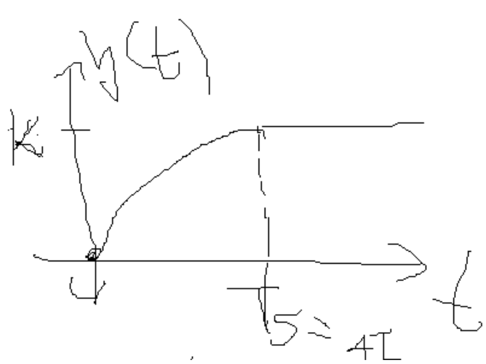
Caso 1:



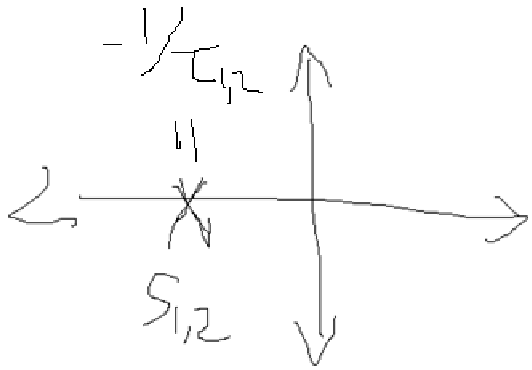
$$\boxed{s_1 = -\xi\omega_n + \omega_n\sqrt{\xi^2 - 1} \ \in \mathbb{R}} \quad (3)$$

$$\boxed{s_2 = -\xi\omega_n - \omega_n\sqrt{\xi^2 - 1} \ \in \mathbb{R}} \quad (4)$$

$$T_s = 4(\tau_1 + \tau_2)$$



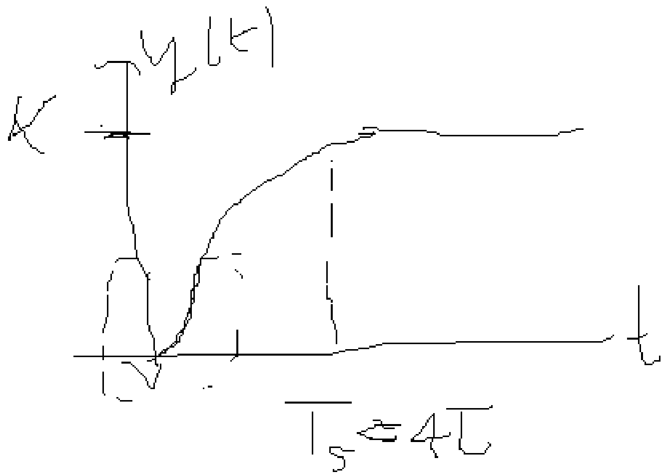
Caso 2:



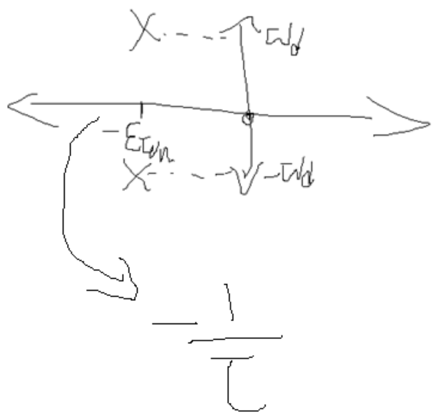
$$\boxed{s_1 = -\omega_n < 0 \ \in \ \mathbb{R} \ \forall \ \xi = 1} \quad (6)$$

$$\boxed{s_2 = -\omega_n < 0 \ \in \ \mathbb{R} \ \forall \ \xi = 1} \quad (7)$$

$$T_s = 4(\tau_1 + \tau_2)$$

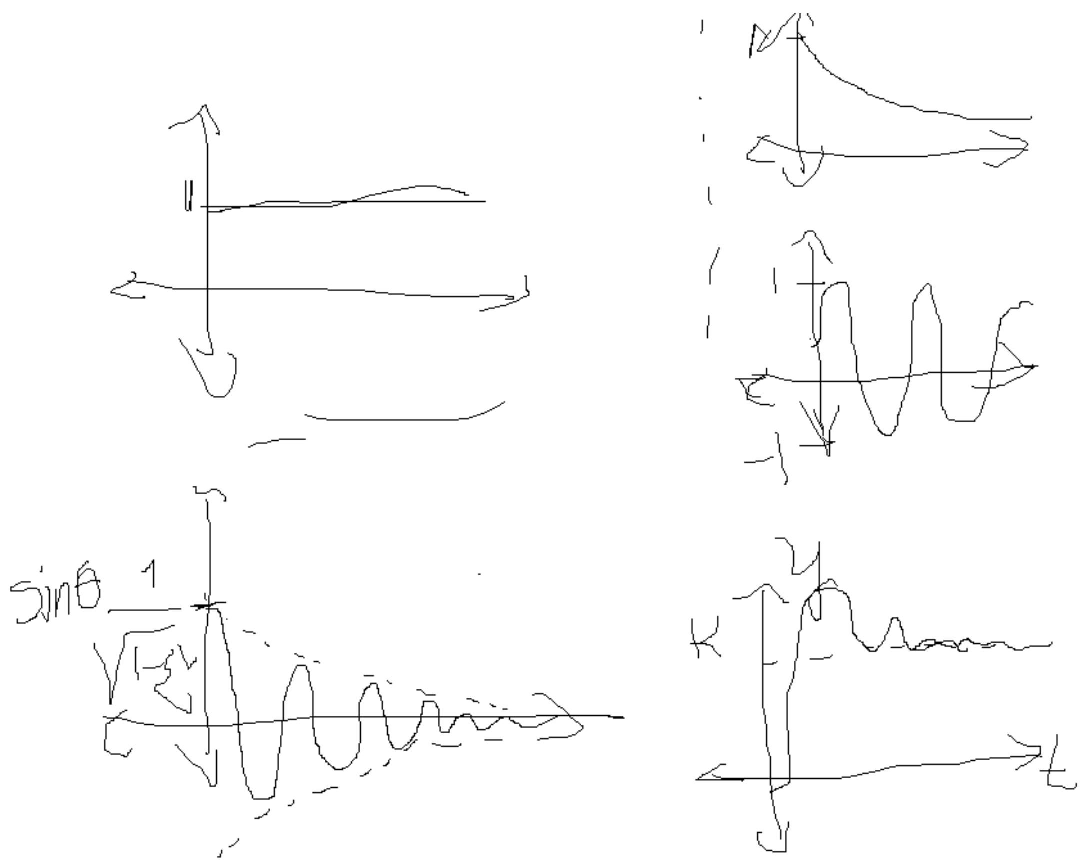


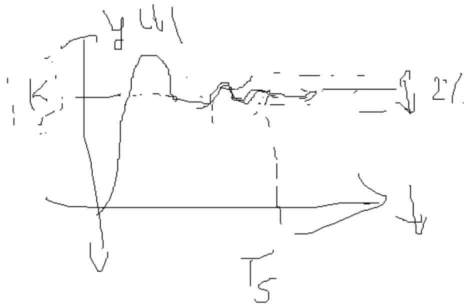
Caso 3:

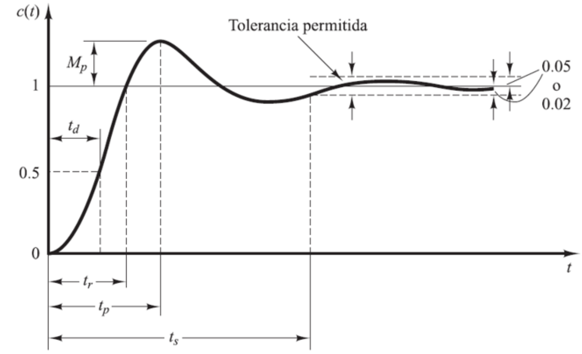


$$s_{1,2} = -\xi\omega_n \pm j\omega_n\sqrt{1-\xi^2}$$

$$\boxed{s_{1,2} = -\sigma \pm \omega_d j \;\in \mathbb{C} \;\forall\; 0 < \xi < 1} \quad (9)$$





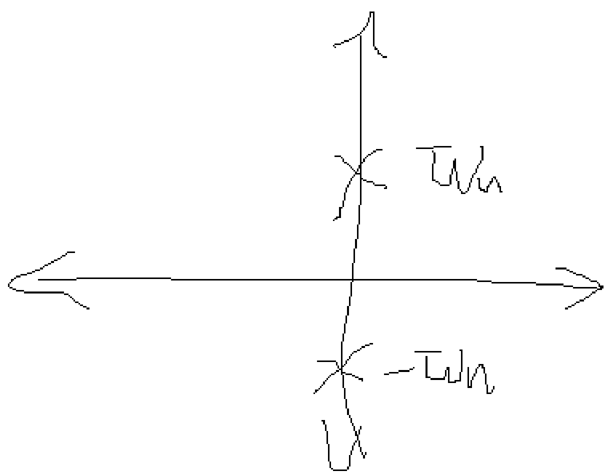


$$SO(\%) = 100e^{\frac{-\xi\pi}{\sqrt{1-\xi^2}}}$$

$$SO = \frac{y_{max} - y_{ss}}{y_{ss}} = e^{\frac{-\xi\pi}{\sqrt{1-\xi^2}}}$$

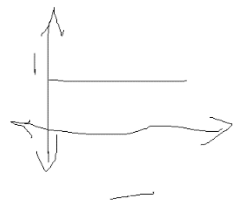
$$T_s \approx 4\tau = \frac{4}{\xi\omega_n}(2\%)$$

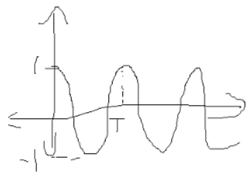
Caso 4:



$$\boxed{s_1 = \omega_n j \in \mathbb{I} \ \forall\, \xi = 0} \ (14)$$

$$\boxed{s_2 = -\omega_n j \ \in \mathbb{I} \ \forall\, \xi = 0} \ (15)$$

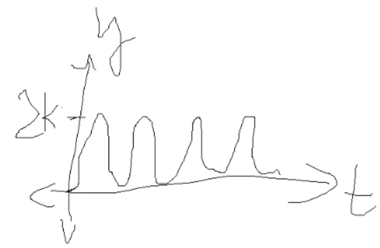




$$T = \frac{1}{F}$$

$$\omega_n = 2\pi f = \frac{2\pi}{T}$$

$$T = \frac{2\pi}{\omega_n}$$



Polos dominantes:

$$H(s) = \frac{3.4}{s^2 + s + 1}, k = 1, \omega_n = 1, \zeta = 0.5$$