

**Polos del sistema de segundo orden (general):**

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

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

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

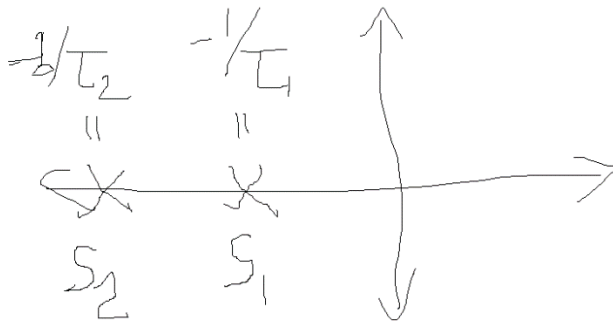
$$s_{1,2} = \frac{-2\xi\omega_n \pm \sqrt{4\omega_n^2(\xi^2 - 1)}}{2}$$

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

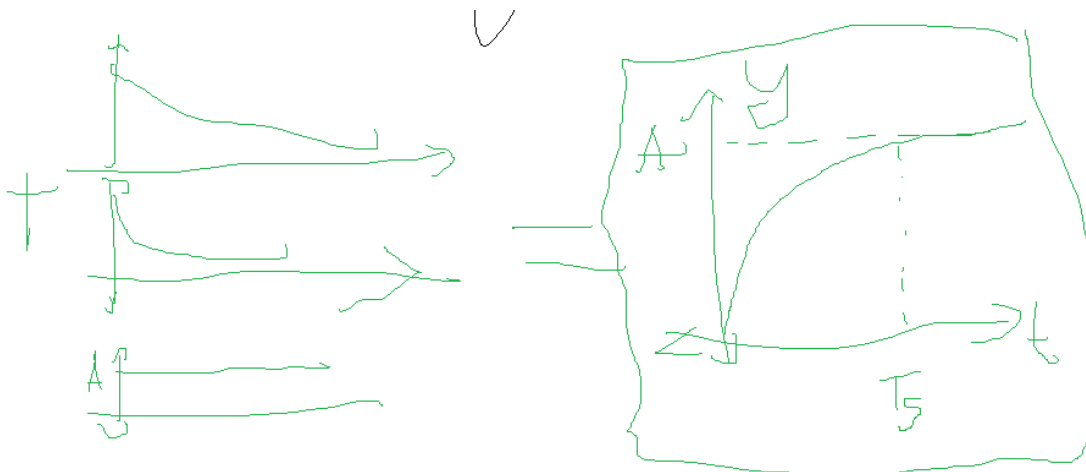
$$s_{1,2} = -\xi\omega_n \pm \omega_n\sqrt{\xi^2 - 1}$$

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

**Caso 1:**



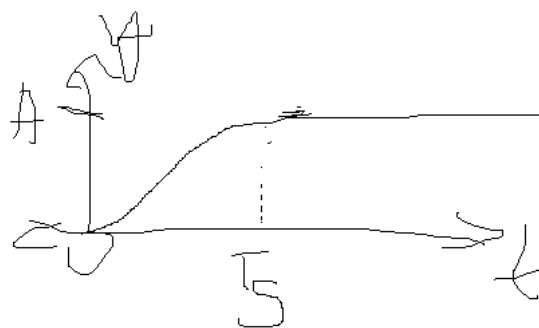
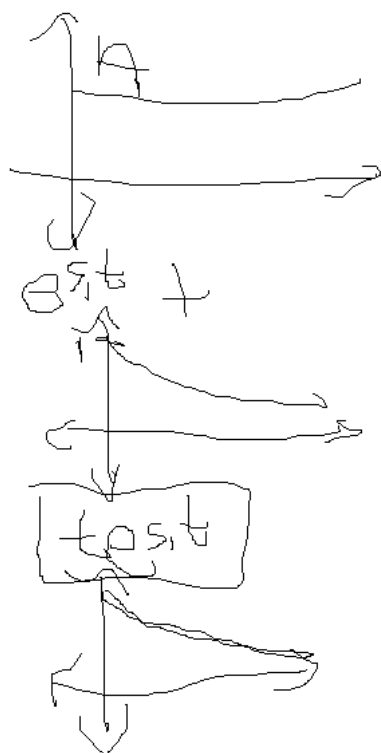
$$T_s = 4(\tau_1 + \tau_2)$$



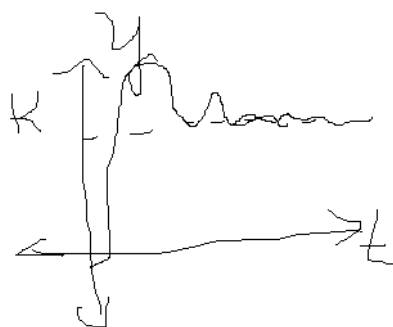
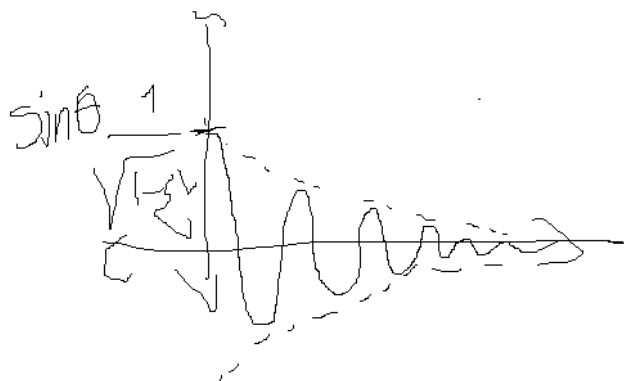
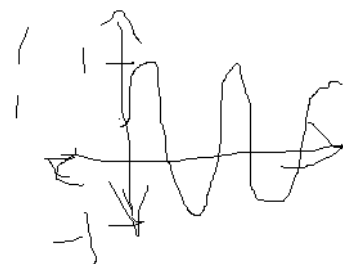
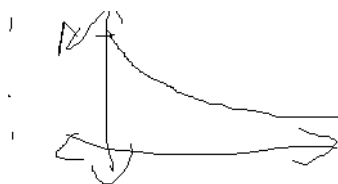
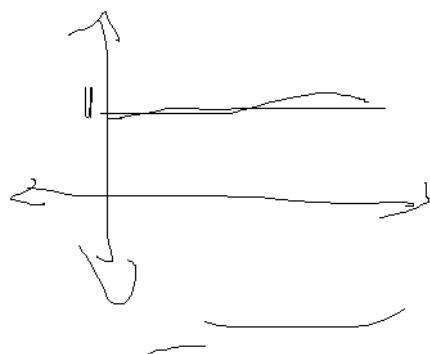
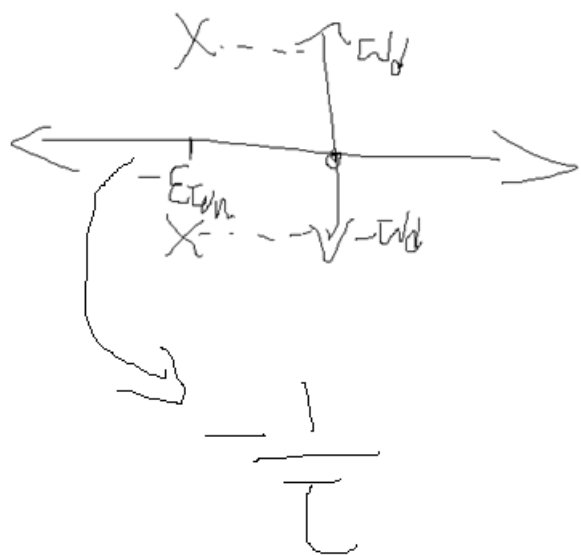
Caso 2:



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



**Caso 3:**



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

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

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

QUIZ

$$\frac{5+3i}{2-4i} = -0.1000 + 1.3000i$$