

Tema 1 - Ejercicio 1:

$$Mt := 5 \text{ kN m}$$

Sección 1

Sección 2

$$CS := 1.6$$

$$L1 := 6 \text{ m}$$

$$Dext1 := 8 \text{ cm}$$

$$Dext2 := 8 \text{ cm}$$

$$\tau_{f1} := 14.2 \frac{\text{kN}}{\text{cm}^2}$$

$$\tau_{adm} := \frac{\tau_{f1}}{CS} = 8.875 \frac{\text{kN}}{\text{cm}^2}$$

$$L2 := 4 \text{ m}$$

$$Dint1 := 7.5 \text{ cm}$$

$$Dint2 := 3 \text{ cm}$$

$$G := 80 \text{ GPa}$$

$$J_{p1} := \frac{\pi \cdot (Dext1^4 - Dint1^4)}{32} = 91.4928 \text{ cm}^4$$

$$J_{p2} := \frac{\pi \cdot (Dext2^4 - Dint2^4)}{32} = 394.1717 \text{ cm}^4$$

$$\Omega1 := \frac{\pi \cdot \left(\frac{Dext1 + Dint1}{2} \right)^2}{4} = 47.173 \text{ cm}^2$$

$$Mtb = (Mt - Mta)$$

$$\left(\theta_a = \frac{Mta \cdot L1}{G \cdot J_{p1}} - \frac{Mtb \cdot L2}{G \cdot J_{p2}} \right) = 0$$

$$\left(\theta_a = \frac{Mta \cdot L1}{G \cdot J_{p1}} - \frac{(Mt - Mta) \cdot L2}{G \cdot J_{p2}} \right) = 0$$

$$Mta := \frac{Mt \cdot L2}{G \cdot J_{p2} \cdot \left(\frac{L1}{G \cdot J_{p1}} + \frac{L2}{G \cdot J_{p2}} \right)} = 0.67 \text{ kN m}$$

$$Mtb := (Mt - Mta) = 4.33 \text{ kN m}$$

$$\theta_c := \frac{Mta \cdot L1}{G \cdot J_{p1}} = 0.0549$$

$$\theta_c := \frac{Mtb \cdot L2}{G \cdot J_{p2}} = 0.0549$$

$$\chi1 := \frac{Mta}{G \cdot J_{p1}} = 0.0092 \cdot \frac{1}{\text{m}}$$

$$\chi2 := \frac{Mtb}{G \cdot J_{p2}} = 0.0137 \cdot \frac{1}{\text{m}}$$

$$\tau1 := \frac{Mta}{2 \cdot \left(\frac{Dext1 - Dint1}{2} \right) \cdot \Omega1} = 2.8407 \frac{\text{kN}}{\text{cm}^2}$$

$$\tau2ext := \frac{Mtb \cdot Dext2}{J_{p2} \cdot 2} = 4.394 \frac{\text{kN}}{\text{cm}^2}$$

$$\tau2int := \frac{Mtb \cdot Dint2}{J_{p2} \cdot 2} = 1.6477 \frac{\text{kN}}{\text{cm}^2}$$

$$Mtbmax := \frac{\tau_{adm} \cdot J_{p2} \cdot 2}{Dext2} = 8.7457 \text{ kN m}$$

$$Mtmax := Mtbmax \cdot \frac{Mt}{Mtb} = 10.099 \text{ kN m}$$

