



# **UNIVERSIDAD FIDELITAS**

**Escuela de Ingeniería Eléctrica**

**Control automático**

Tarea#4

Respuesta temporal en el plano complejo

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Para 3 en parte real

$$\gamma = \cos(30)$$

$$\gamma = \frac{\sqrt{3}}{2}$$

$$\alpha = \gamma \omega_n$$

$$\frac{\alpha}{\gamma} = \omega_n$$

$$\frac{3}{\frac{\sqrt{3}}{2}} = \omega_n$$

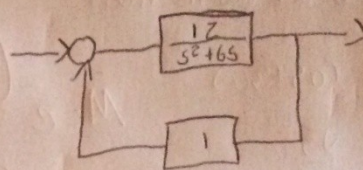
$$2\sqrt{3} = \omega_n$$

$$M = e^{-\left(\frac{\gamma \pi}{\sqrt{1-\gamma^2}}\right)}$$

$$M = e^{-\left(\frac{\frac{\sqrt{3}}{2} \pi}{\sqrt{1-\left(\frac{\sqrt{3}}{2}\right)^2}}\right)}$$

$$M = 0,004 \Rightarrow 0,4\%$$

$$t_{s2\%} = \frac{4}{\gamma \omega_n} = \frac{4}{\frac{\sqrt{3}}{2} \cdot 2\sqrt{3}} \Rightarrow \frac{4}{3} \approx 1,33s$$



$$\gamma = \cos(60)$$

$$\gamma = \frac{1}{2}$$

$$\alpha = \gamma \omega_n$$

$$\frac{\alpha}{\gamma} = \omega_n$$

$$\frac{3}{\frac{1}{2}} = \omega_n$$

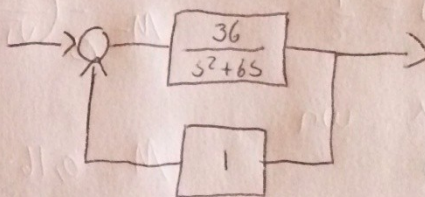
$$6 = \omega_n$$

$$M = e^{-\left(\frac{\gamma \pi}{\sqrt{1-\gamma^2}}\right)}$$

$$M = e^{-\left(\frac{\frac{1}{2} \pi}{\sqrt{1-\left(\frac{1}{2}\right)^2}}\right)}$$

$$M = 0,16 \Rightarrow 16\%$$

$$t_{s2\%} = \frac{4}{\gamma \omega_n} = \frac{4}{\left(\frac{1}{2}\right)(6)} \Rightarrow \frac{4}{3} \approx 1,33s$$



Para b en Parte Real

$$y = \cos(36)$$

$$y = \frac{\sqrt{3}}{2}$$

$$\alpha = y \omega_n$$

$$\frac{\alpha}{y} = \omega_n$$

$$\frac{b}{\frac{\sqrt{3}}{2}} = \omega_n$$

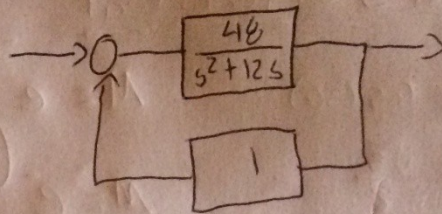
$$4\sqrt{3} = \omega_n$$

$$M = e^{-\left(\frac{y\pi}{\sqrt{1-y^2}}\right)}$$

$$M = e^{-\left(\frac{\frac{\sqrt{3}}{2}\pi}{\sqrt{1-\left(\frac{\sqrt{3}}{2}\right)^2}}\right)}$$

$$M = 0,004 \Rightarrow 0,4\%$$

$$t_{s2\%} = \frac{4}{y \omega_n} = \frac{4}{\frac{\sqrt{3}}{2} \times 4\sqrt{3}} = \frac{2}{3} \approx 0,66 s$$



$$y = \cos(60)$$

$$y = \frac{1}{2}$$

$$\frac{\alpha}{y} = \omega_n$$

$$\frac{b}{\frac{1}{2}} = \omega_n$$

$$12 = \omega_n$$

$$M = e^{-\left(\frac{\frac{1}{2}\pi}{\sqrt{1-\left(\frac{1}{2}\right)^2}}\right)}$$

$$M = 0,16 \Rightarrow 16\%$$

$$t_{s2\%} = \frac{4}{y \omega_n} = \frac{4}{\frac{1}{2} \times 12} = \frac{2}{3} \approx 0,66 s$$

