

$$G(s) = \frac{1}{sT+1}, \quad u(t) = \mathbb{1}(t) \Rightarrow U(s) = \frac{1}{s}$$

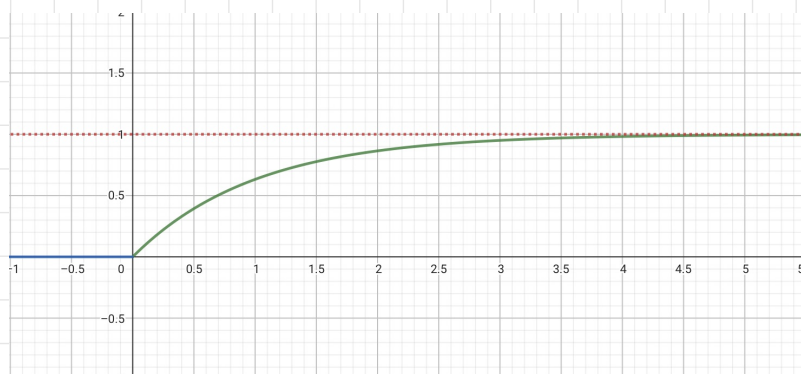
$$\Rightarrow Y(s) = \frac{1}{sT+1} \cdot \frac{1}{s} = \frac{1}{s(sT+1)} = \frac{1}{T(s+\frac{1}{T})s} \cdot \frac{T}{T} = \frac{\frac{1}{T}}{s(s+\frac{1}{T})} = \frac{z_1}{s} + \frac{z_2}{s+\frac{1}{T}}$$

$$\begin{cases} P_1 = 0 \\ P_2 = -\frac{1}{T} \end{cases} \Rightarrow \lim_{s \rightarrow 0} s \cdot \frac{\frac{1}{T}}{s(s+\frac{1}{T})} \rightarrow \textcircled{1}^{z_1}, \quad \lim_{s \rightarrow -\frac{1}{T}} (s+\frac{1}{T}) \cdot \frac{\frac{1}{T}}{s(s+\frac{1}{T})} \rightarrow \textcircled{-1}^{z_2}$$

$\Rightarrow$  Riscrivo

$$\frac{\frac{1}{T}}{s(s+\frac{1}{T})} = \frac{1}{s} - \frac{1}{s+\frac{1}{T}} \quad Y(s)$$

trovo  $y(t)$  come  $y(t) = \mathcal{L}^{-1}[Y(s)] = \mathbb{1}(t) - e^{-\frac{1}{T}t} \cdot \mathbb{1}(t) \equiv (1 - e^{-\frac{1}{T}t}) \cdot \mathbb{1}(t) \equiv 1 - e^{-\frac{1}{T}t}, t \geq 0$



IL sys è STABILE

Siccome  $G(s) = \frac{1}{sT+1}$  ha  $p = -\frac{1}{T}$



COME DISEGNARE LA RISPOSTA?

Valore iniziale:  $\lim_{t \rightarrow 0} y(t) = \lim_{s \rightarrow \infty} s \cdot Y(s) = \lim_{s \rightarrow \infty} s \left( \frac{1}{s} - \frac{1}{s+\frac{1}{T}} \right)$

$$= \lim_{s \rightarrow \infty} 1 - \frac{s}{s+\frac{1}{T}} = \textcircled{0} \text{ in } t=0$$

Valore finale: REGIME  $\lim_{s \rightarrow 0} \left( \frac{s}{s} - \frac{s}{s+\frac{1}{T}} \right) \rightarrow \textcircled{1} \text{ in } t \rightarrow \infty$

Pendenza della retta in 0:

(1) Trovo la derivata con le proprietà:

$$\mathcal{L}\left[\frac{d}{dt} y(t)\right] = s \cdot Y(s) = 1 - \frac{s}{s+\frac{1}{T}}$$