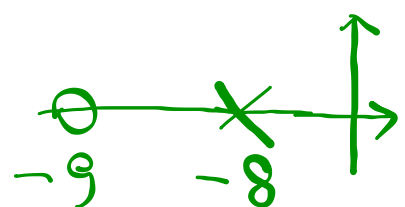


$$G(s) = \frac{1}{s(s+5)(s+6)}$$

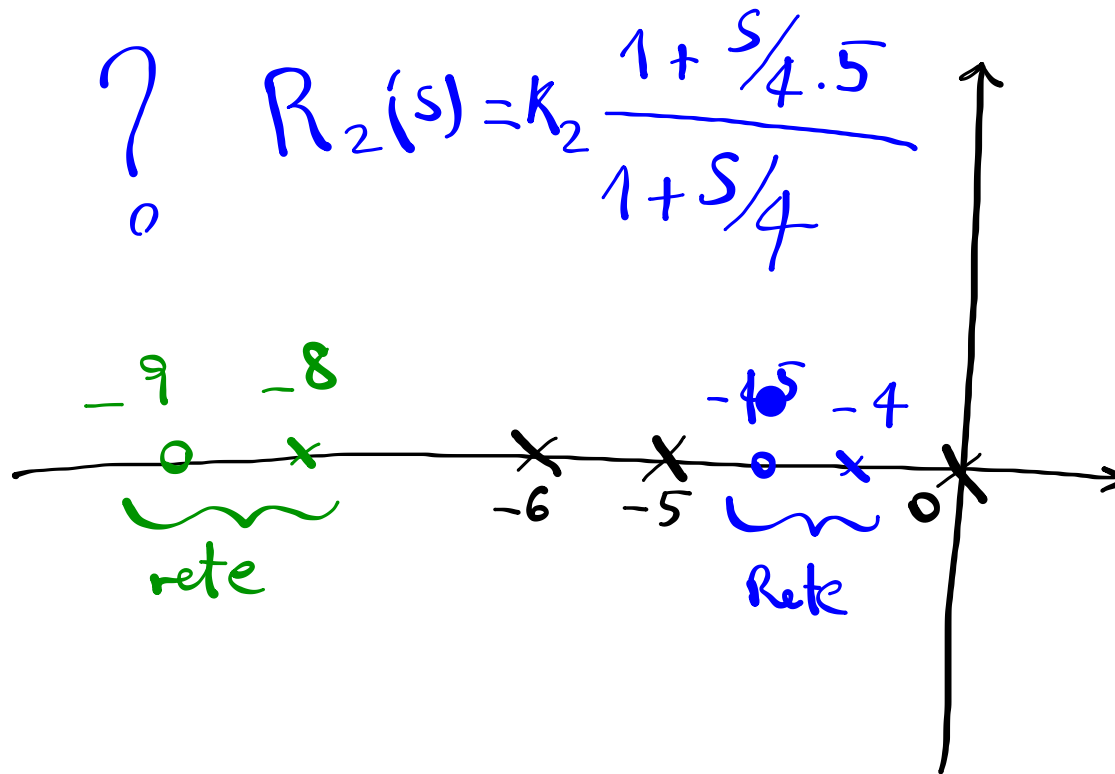
Progetto indiretto del regolatore

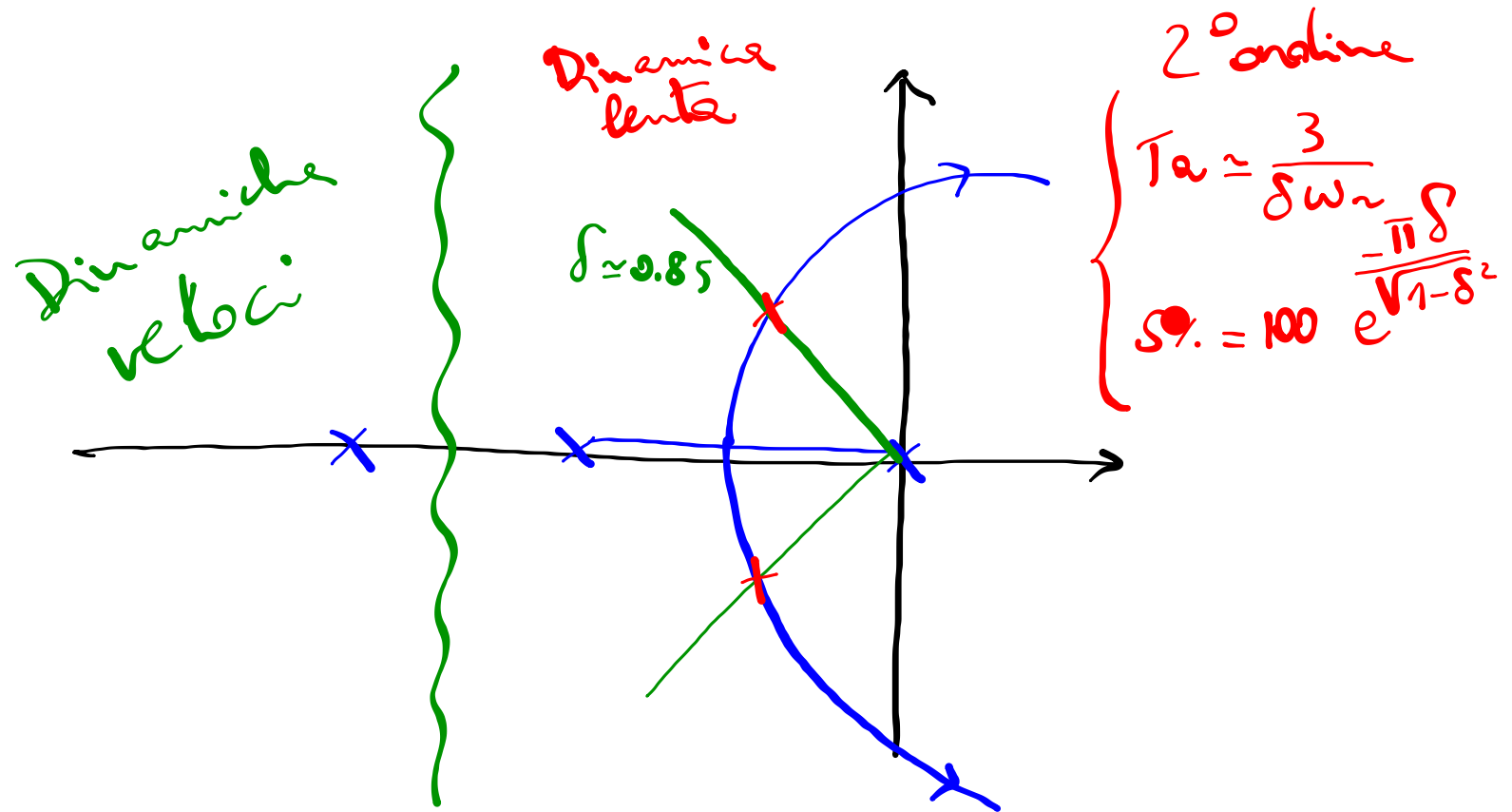
$$R(s) = K_1 \frac{1 + s/9}{1 + s/8}$$


- Determinare K_1 :

$$\begin{cases} S\% \leq 1\% \quad (\delta \geq 0.85) \\ T_a \leq 2.5s \end{cases}$$

- Discretizzare $R(s)$ con Tustin $T = 0.02s$





1° tentativo

$$K \approx 32$$

$$\begin{cases} T_d \approx 2.05s & \text{OK } (\leq 2.5s) \\ S\% \approx 1.3\% & \text{NO } (\leq 1\%) \end{cases}$$

• $K \downarrow \Rightarrow T_d \uparrow \quad S\% \downarrow$

2° tentativo

$$K = 29$$

$$\begin{cases} T_d = 2.4s \\ S\% \approx \underline{\underline{0.5\%}} \end{cases} \quad \underline{\text{margin}}$$

Discretizzazione con Tustin

- $R(z) = R(s) \Big|_{s = \frac{2}{T} \frac{z-1}{z+1}}$

approssimazione
di $\underline{z = e^{sT}}$

$T = 0.02 \text{ s}$

$R(s)$ stabile
 $\Downarrow$
 $R(z)$ stabile

l sim info

- durate di simulazione diverse

$$t' : |y(t')| \leq \varepsilon$$

$l \text{ sim info}(y, t)$

$$t = [\dots]$$

$$y = [\dots]$$

variano
a seconda
della
durata della simulazione t'

