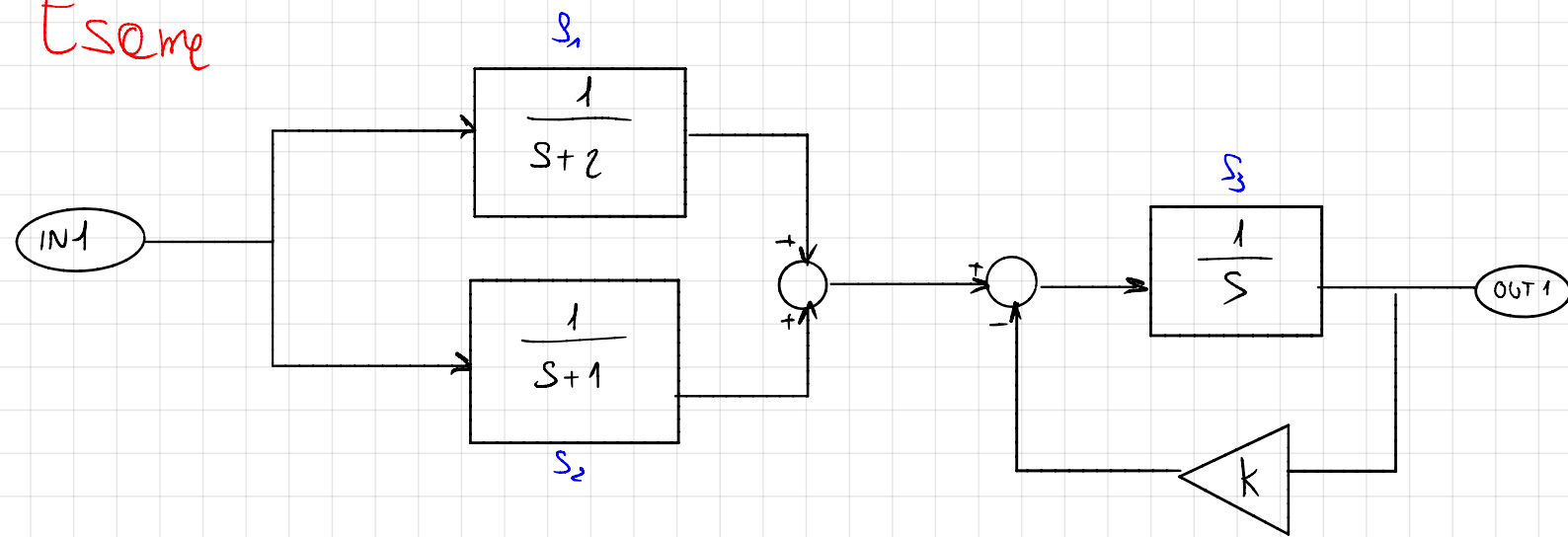


# Esame



1) Eq. di stato e fun. di trasf per  $k = 1; \frac{3}{2}; 2$

$$S_{PAR} = \frac{1}{s+2} + \frac{1}{s+1} = \frac{s+1+s+2}{(s+2)(s+1)} = \frac{2s+3}{s^2+3s+2}$$

$$S_{SER} = \frac{\frac{1}{s}}{1 + \frac{1}{s} \cdot k} = \frac{1/s}{\frac{s+k}{s}} = \frac{1}{s+k}$$

$$\underline{\underline{S_{TOT} = \frac{2s+3}{(s+2)(s+1)} \cdot \frac{1}{s+k} = 2 \cdot \frac{(s+3/2)}{(s+2)(s+1)(s+k)}}}}$$

$$k=1 \quad S_{TOT1} = 2 \cdot \frac{s+3/2}{(s+2)(s+1)^2}$$

$$k=\frac{3}{2} \quad S_{TOT2} = 2 \cdot \frac{1}{(s+2)(s+1)}$$

cancellazione zero-polo in serie  $\Rightarrow$  perdita di controllabilità

$$k=2 \quad S_{TOT2} = 2 \cdot \frac{(s+\frac{3}{2})}{(s+2)^2(s+1)}$$

2) Stabilità, osservabilità, controllabilità

	$k=1$	$k=\frac{3}{2}$	$k=2$
STAB.	✓	✓	✓
CONTR.	✓	X	✓
OSSERV.	✓	✓	✓

3) Th. valor iniziale per  $k=1$

$$\lim_{t \rightarrow 0^+} f(t) = \lim_{s \rightarrow \infty} s F(s)$$

$$F(s) = \frac{2 \left( s + \frac{3}{2} \right)}{(s+1)^2 (s+2)}$$

lo vedo dal plot  
di `impulse(sys_k1)`  $\rightarrow = 0$

$$= \lim_{s \rightarrow \infty} s \cdot \frac{2 \left( s + \frac{3}{2} \right)}{(s+1)^2 (s+2)} = 0$$

Lunga divisione

$$F(s) = \frac{2s+3}{s^3+4s^2+5s+2}$$

ordine relativo = 2  $\rightarrow$  primo termine  $\neq 0$  in  $s^{-2}$

$2s+3$	$s^3+4s^2+5s+2$
$2s+8+10s^{-1}+4s^2$	$2s^{-2}-5s^{-3}+\dots$
$-5-10s^{-1}-4s^2$	
$-5-20s^{-1}-25s^2-10s$	
$10s^{-1}+21s^{-2}+10s^3$	
$\dots$	

$$f(0^+) = 0$$

$$\dot{f}(0^+) = 2$$

$$\ddot{f}(0^+) = -5$$