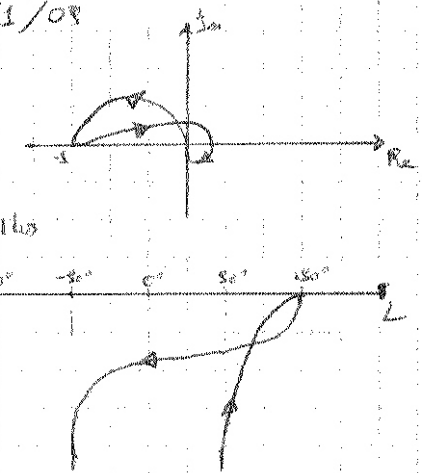
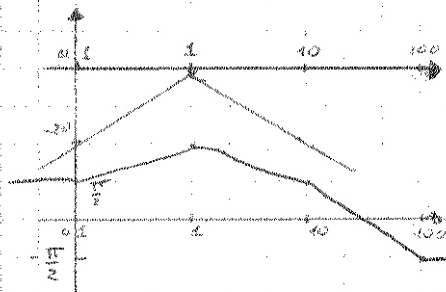


1) $G(s) = \frac{3 \cdot \left(1 - \frac{1}{10}\right)^2}{(s-2)^2 \left(1 + \frac{1}{50} + \frac{1}{100}\right)}$



NON ASINTOTICAMENTE STABILE

2) $\begin{pmatrix} \dot{x}_1 \\ \dot{x}_2 \end{pmatrix} = \begin{pmatrix} 0 & 1 \\ -1 & -2 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} + \begin{pmatrix} 0 \\ 1 \end{pmatrix} u$
 $y = \begin{pmatrix} 10 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$

$|G(s, s)| = 0,63$
 $\angle G(s, s) = -2,27$

$y(t) = 1 \cdot 0,63 \cdot \sin(5t - 2,34)$

$u(t) = t \cdot 1(t) - (t-3)1(t-3) - 1(t-5)$

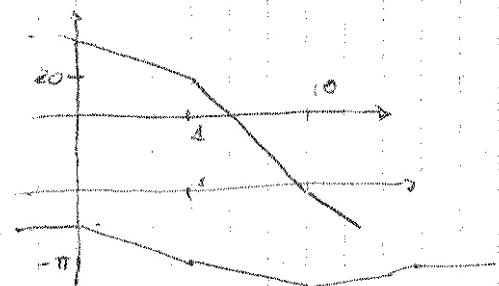
RISPOSTA AL COMANDO UNITARIO $Y_1(s) = \frac{3+10}{(s+1)^2 \cdot 3} = \frac{10}{3} - \frac{10}{s+1} - \frac{9}{(s+1)^2}$

$y_1(t) = (10 - 10e^{-t} - 9te^{-t}) \cdot 1(t)$

RISPOSTA ALLA RAMPIN UNITARIA $Y_2(s) = \frac{3+10}{(s+1)^2 \cdot s^2} = \frac{10}{s^2} - \frac{19}{s} + \frac{19}{s+1} + \frac{9}{(s+1)^2}$

$y_2(t) = (10t - 19 + 19e^{-t} + 9te^{-t}) \cdot 1(t)$

$y(t) = y_2(t) - y_2(t-3) - y_1(t-5)$



3) $C(s) = \frac{K_c}{s}$. Per $K_c=1$ $F(s) = \frac{10}{s} \frac{1 + \frac{1}{10}}{(s+1)^2}$

Abbattere il guadagno.

Ad esempio $K_c = 0,1$

4) $\begin{cases} X(k+1) = 0,6703 X(k) + 0,08262 U(k) \\ Y(k) = 5 X(k) \end{cases}$

ASINTOTICAMENTE STABILE (autovalore 0,6703 in modulo minore di 1)

Impulso $X_e = 0,6703 X_e \Rightarrow X_e = 0$