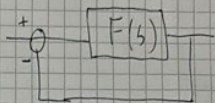


LUGLIO 2024

① DISEGNA IL DIAGRAMMA DI BODE E POLINOME DI: $\frac{K(s^2-1)}{s(s^2+s+100)}$

② PER IL SISTEMA AD ANELLO CHIUSO CON $F(s) = \frac{K(s^2-1)}{s(s^2+s+100)}$



STABILITÀ AL VARIARE DI K CON ROUTH

$$\begin{cases} \dot{X} = \begin{pmatrix} 0 & 1 \\ a & b \end{pmatrix} X + \begin{pmatrix} 0 \\ 1 \end{pmatrix} u \\ Y = \begin{pmatrix} 1 & 1 \end{pmatrix} X \end{cases}$$

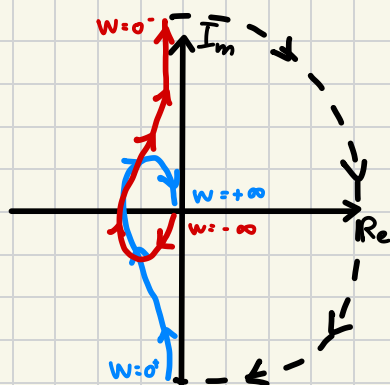
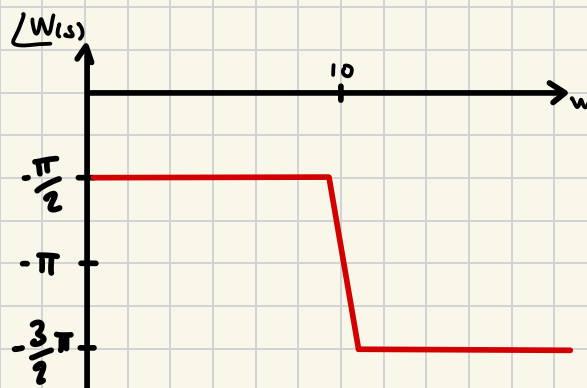
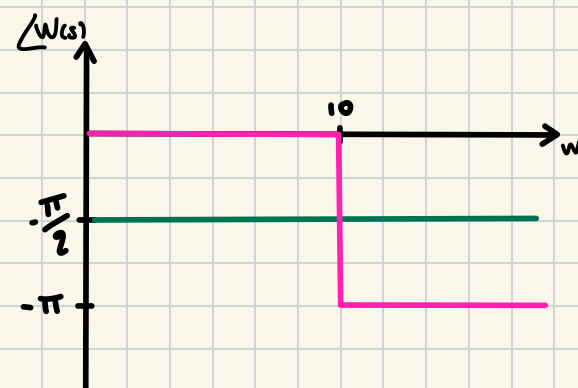
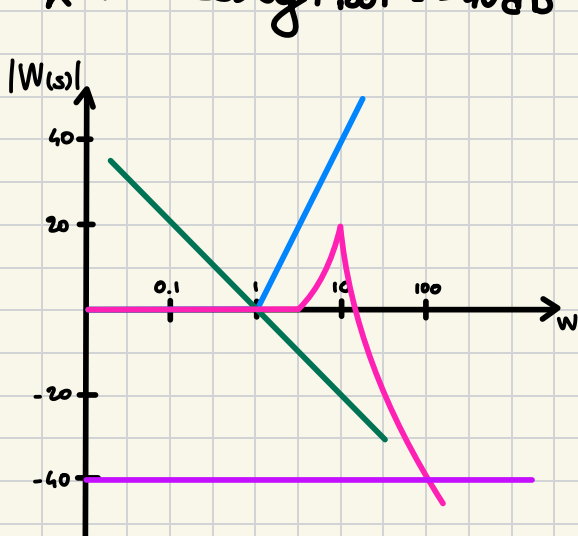
STUDIARE MODI NATURALI AL VARIARE DI a e b . PER OGNI CASO ASSOCIARE LE TRAIETTORIE QUALITATIVE DELLO STATO A PARTICOLE DA: $X_0 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ e $X_0 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$

ESERCIZIO 1

$$W(s) = \frac{K(s^2 - 1)}{s(s^2 + s + 100)} = \frac{K(s+1)(s-1)}{100 \cdot s(1 + \frac{s}{100} + \frac{s^2}{100})}$$

$$W_n = 10 \quad \frac{2}{10} \zeta = \frac{1}{100} \rightarrow \zeta = \frac{1}{20}$$

$$K=1 \quad 20 \log |1/100| = -40 \text{ dB}$$



ESERCIZIO 2

$$W(s) = \frac{K(s^2 - 1)}{s(s^2 + s + 100)} \rightarrow P(s) = s^3 + s^2 + 100s$$

INSTABILE PERCHÉ MANCA IL TERMINE NOTO

AD ANELLO APERTO CONSIDERO I POLI
IN RETROAZIONE CONSIDERO POLI + ZERI

Handwritten signature

ESERCIZIO 3

$$\begin{cases} \dot{x} = \begin{pmatrix} 0 & 1 \\ a & b \end{pmatrix} x + \begin{pmatrix} 0 \\ 1 \end{pmatrix} u \\ y = (1 \ 1) x \end{cases}$$

STUDIARE I MODI NATURALI

AUTOVALORI:

$$\text{DET}(A - \lambda I) = 0$$

$$\begin{vmatrix} -\lambda & 1 \\ a & b - \lambda \end{vmatrix} = \lambda^2 - b\lambda - a \rightarrow \lambda = \frac{b \pm \sqrt{b^2 + 4a}}{2} =$$

