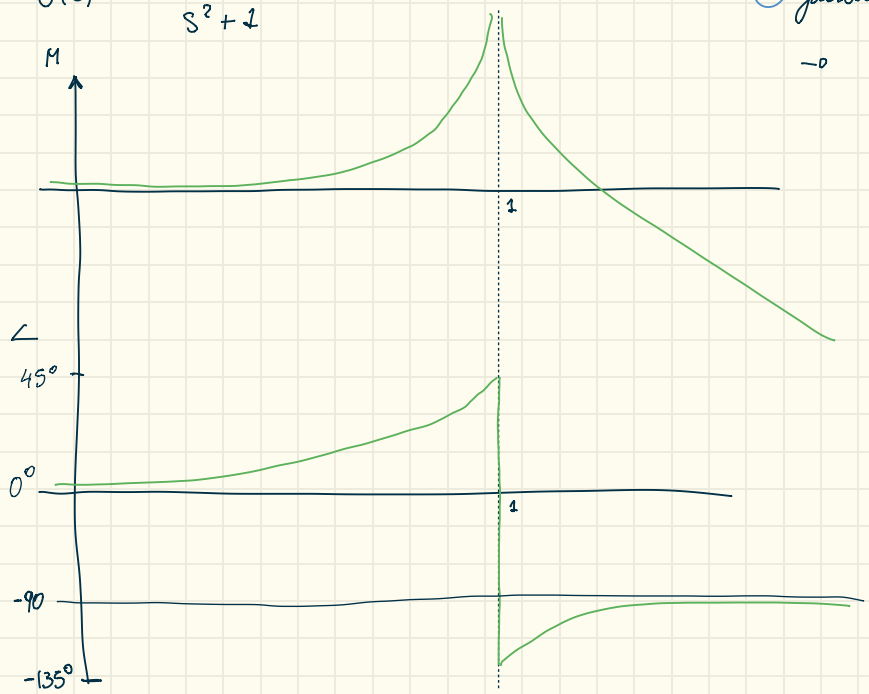
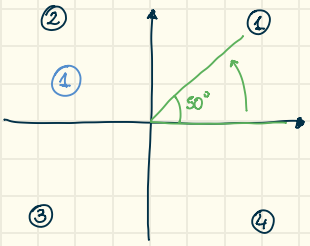
$$G(S) = \frac{S+1}{S^2+1}$$

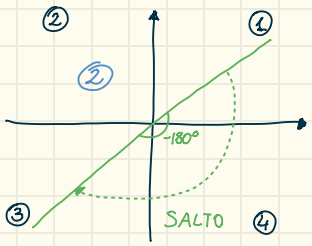


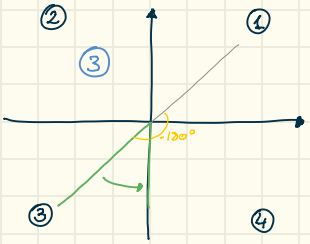
① Guardo il diagramma di Bode delle fasi

→ $\varphi \tilde{\in} [-180°, \sim 50°]$

Nello specifico abbiamo:





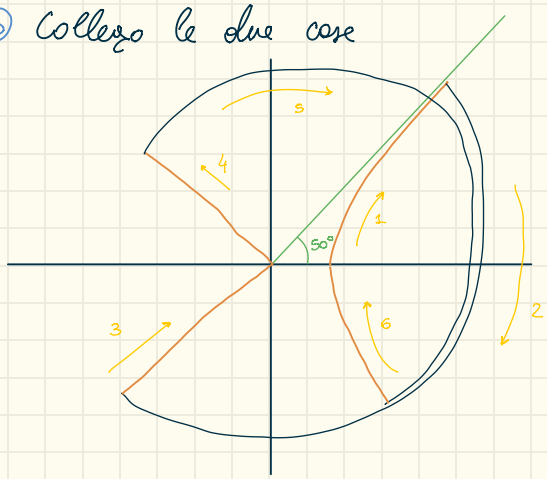


- Il diag di Nyquist occupa solo il 1° ed il 3° quadrante, negli altri effettua solo salti (----)

② Guardo il diagramma dei Moduli

	$\omega < 1$	$\omega = 1$	$\omega > 1$	
M	Cresce → ∞	$M = \infty$	Decresce → $-\infty$	$-\infty$ dB = $\nexists$ V.N.
φ	Cresce $\tilde{\to}$ 50°	SALTO + ~50 → −180°	Cresce → −90°	

③ Collego le due cose



μ = 0dB = 1 volore Naturale

$$G(s)=\frac{10(s-1)}{s(s+1)(s^2+8s+25)} \quad \rightarrow \quad \mu=\lim_{s\to 0} s\,G(s)=\lim_{s\to 0}\frac{10(s-1)}{(s+1)(s^2+8s+25)} \rightarrow \frac{-10}{25}=-0.4$$

1. Punto di partenza

Sempre così

Usiamo la funzione approssimante $G_0(s)\approx \lim_{s\to 0} G(s)=\frac{K}{s^g}=-\frac{10}{25}\frac{K}{s}$

- 1 polo in 0 $\Rightarrow$ -20dB/dec ma $G_0<0 \Rightarrow M_{FIN}=+\infty$
- 1 Polo in 0 $\Rightarrow \varphi_0=-90°$ ma $G_0<0 \Rightarrow \varphi_0=90°\equiv -270°=-\frac{3}{2}\pi$

2. Partenza in anticipo o Ritardo

Partenza in ... $\begin{cases}\Delta\tau<0 & \text{ANTICIPO}\\ \Delta\tau>0 & \text{RITARDO}\end{cases}$ Rispetto a φ_0 con $\Delta\tau=\sum\tau_{POLI}-\sum\tau_{ZERI}$

Nel nostro caso:

z_1: $s-1=0 \rightarrow \bar{s}=1$ $\Rightarrow \tau_1=1$

P_1: $s+1=0 \rightarrow \bar{s}=-1$ $\Rightarrow \tau_2=\left|\frac{1}{-1}\right|=1$

P_2: $s^2+8s+25 \sim 8s+25=0 \rightarrow \bar{s}=-\frac{25}{8}$ $\Rightarrow \tau_3=\left|\frac{1}{-\frac{25}{8}}\right|=\frac{8}{25}$

$\Rightarrow \Delta\tau=\sum\tau_{POLI}-\sum\tau_{ZERI}=1-\left(1+\frac{8}{25}\right)=-\frac{53}{25}$ $\Rightarrow$ RITARDO rispetto $\varphi_0=-\frac{3}{2}\pi=-270°$

3. Asintoto

C'è un asintoto solo se $g=1$ ed è sempre VERTICALE

Possiamo trovare l'ascissa con: $\sigma_a=K\Delta_\tau=-\frac{10}{25}\cdot\left(-\frac{53}{25}\right)=\frac{116}{125}=0.928>0$

DA FINIRE