

$$G(s) = \frac{2}{s+1}, \quad G(j\omega) = \frac{2}{j\omega+1}$$

$\omega = 0$	$ G(j\omega) = 2, \quad \angle G(j\omega) = \angle 2 - \angle 1 = 0$
$\omega = 1$	$ G(j\omega) = \frac{2}{\sqrt{1^2+1^2}} = \frac{2}{\sqrt{2}} = \sqrt{2}$ $\angle G(j\omega) = 0 - \tan^{-1} \frac{1}{1} = -45^\circ$
$\omega = 2$	$ \dots = \frac{2}{\sqrt{5}} \quad \angle 0 - \tan^{-1} \frac{2}{1} \approx -50$
$\omega \rightarrow \infty$	$ \dots = 0 \quad \angle = -90^\circ$

K	K [dB]
100	40 dB
10	20 dB
1	0 dB
0.1	-20 dB
0.01	-40 dB

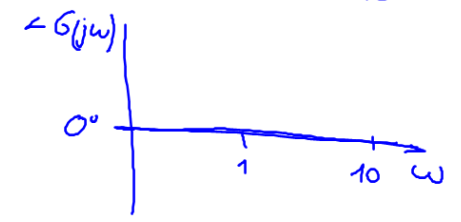
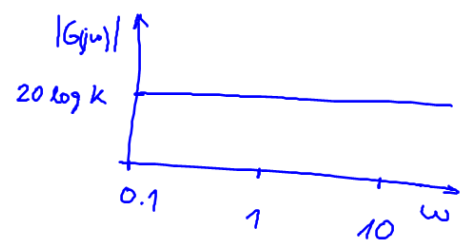
$$G(s) = \frac{2000 (s+0.5)}{s(s+10)(s+50)} = 20 \phi \phi \cdot \frac{0.5 (\frac{1}{0.5}s + 1)}{s \cdot 10 (\frac{1}{10}s + 1) \cdot 50 (\frac{1}{50}s + 1)}$$

$$= 2 \frac{\frac{1}{0.5}j\omega + 1}{(\frac{1}{10}j\omega + 1)(\frac{1}{50}j\omega + 1)} \cdot \frac{1}{j\omega}$$

$$G(j\omega) = K$$

$$|G(j\omega)| = 20 \log_{10} K \text{ dB}$$

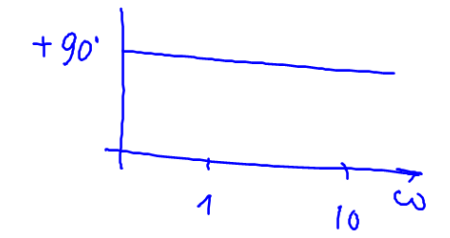
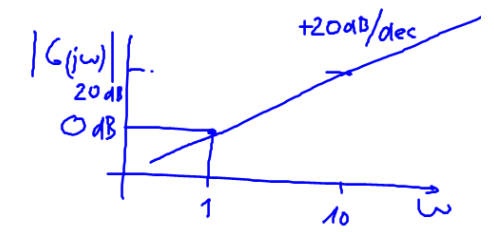
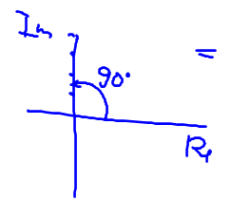
$$\angle G(j\omega) = 0^\circ$$



$$G(j\omega) = j\omega$$

$$|G(j\omega)| = 20 \log \omega$$

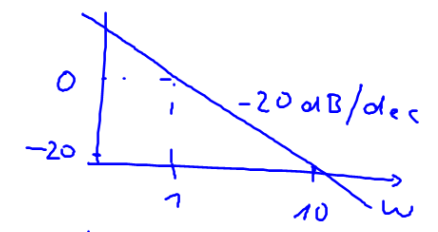
$$\angle G(j\omega) = \tan^{-1} \frac{\text{Im}}{\text{Re}} = \tan^{-1} \frac{\omega}{0}$$



$$G(j\omega) = (j\omega)^{-1} = \frac{1}{j\omega}$$

$$|G(j\omega)| = 20 \log \frac{1}{\omega} = -20 \log \omega$$

$$\angle G(j\omega) = -90^\circ$$



$$G(j\omega) = j\omega T + 1$$

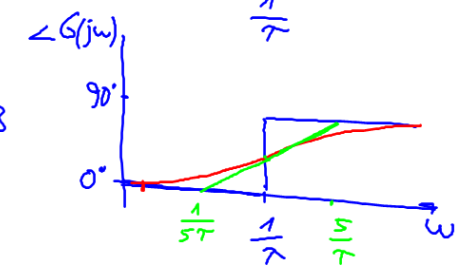
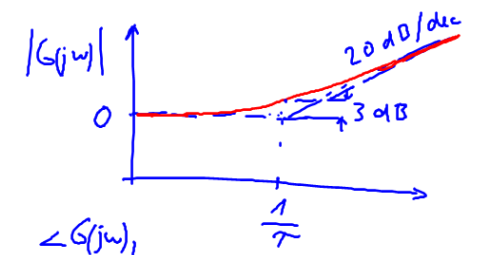
$$20 \log \sqrt{(\omega T)^2 + 1}$$

1) $\omega \ll \frac{1}{T}$

$$|G(j\omega)| = 20 \log 1 = 0 \text{ dB}$$

2) $\omega \gg \frac{1}{T}$... $|G(j\omega)| = 20 \log \omega$

3) $\omega = \frac{1}{T}$... $20 \log \sqrt{1^2 + 1^2} \approx 3 \text{ dB}$

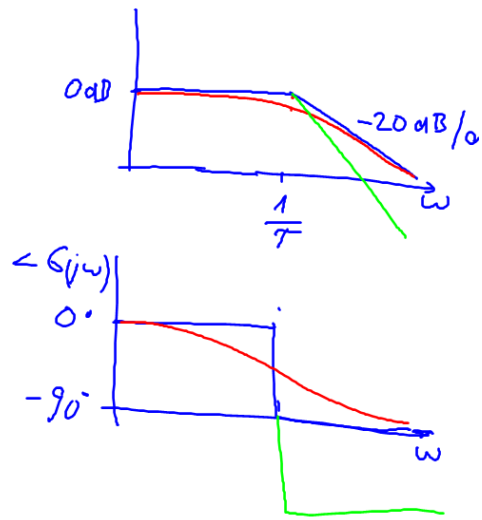


$$G(j\omega) = \frac{1}{(j\omega T + 1)^2}$$

$$|G(j\omega)|:$$

$$1) \omega \ll \frac{1}{T}$$

$$2) \omega \gg \frac{1}{T}$$



$$G(j\omega) = \left(\frac{j\omega}{\omega_n}\right)^2 + 2\zeta \frac{j\omega}{\omega_n} + 1$$

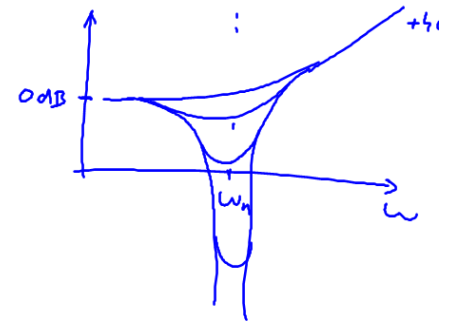
$$\zeta = 0$$

$$\textcircled{1} \omega \ll \omega_n \dots |G(j\omega)| = 20 \log 1 = 0 \text{ dB}$$

$$\textcircled{2} \omega \gg \omega_n \quad 20 \log \omega^2 = 40 \log \omega$$

$$\textcircled{3} \omega = \omega_n \dots 20 \log (-1 + 1)$$

$$\zeta > 0 \quad 20 \log \left(2\zeta \frac{1}{T}\right)$$



$$G = \frac{(s+1)}{s(s+2)(s+10)} = \frac{1}{s} \frac{s+1}{2(\frac{1}{2}s+1) \cdot 10(\frac{1}{10}s+1)}$$

$$\begin{matrix} 0 & -1 & -2 & -10 \\ \text{pool} & \text{nut} & \text{pool} & \text{pool} \end{matrix} = \frac{1}{20} \cdot \frac{1}{j\omega} \cdot \frac{j\omega+1}{(\frac{1}{2}j\omega+1)(\frac{1}{10}j\omega+1)}$$

