Handout 1: Bode plot rules reminder

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General: Bode plot is to plot magnitudes using logarithm scale, phases using log scales. Indeed:

$$G(j\omega) = \frac{s_1 s_2}{s_3} = \frac{r_1 e^{j\theta_1} r_2 e^{j\theta_2}}{r_3 e^{j\theta_3}} =$$

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

Then $\log_{10} |G(j\omega)| =$.

Recall $\log_{10} Ae^{j\phi} =$

In decibels: $|G|_{\text{db}} =$

- Bode plots of systems
- The range over which system behavior can be plotted is
- Bode plots can be determined
- Compensation can

Example: $KG(j\omega) = \dfrac{j\omega\tau_1 + 1}{(j\omega)^2(j\omega\tau_a + 1)}$

Phase($KG(j\omega)$)=

$\log |KG(j\omega)| =$

in Decibels, $|KG(j\omega)_{\text{db}}| =$

Basic terms for transfer functions:

1. $K(j\omega)^n$

   Bode plot for $n = 0, 1, -1, -2$

2. $(j\omega\tau + 1)^{\pm 1}$

3. $\left((\frac{j\omega}{\omega_n})^2 + 2\zeta\frac{j\omega}{\omega_n} + 1\right)^{\pm 1}$

Example: $G(s) = \dfrac{2000(s+0.5)}{s(s+10)(s+50)}$

Write transfer function in standard form

Bode plot

Example: $G(s) = \dfrac{0.01(s^2 + 0.01s + 1)}{s^2((s/2)^2 + 0.02(s/2) + 1)}$

Bode plot