

Control Systems : Set 9 : Loopshaping (5)

Prob 1 | For a system with open-loop transfer function

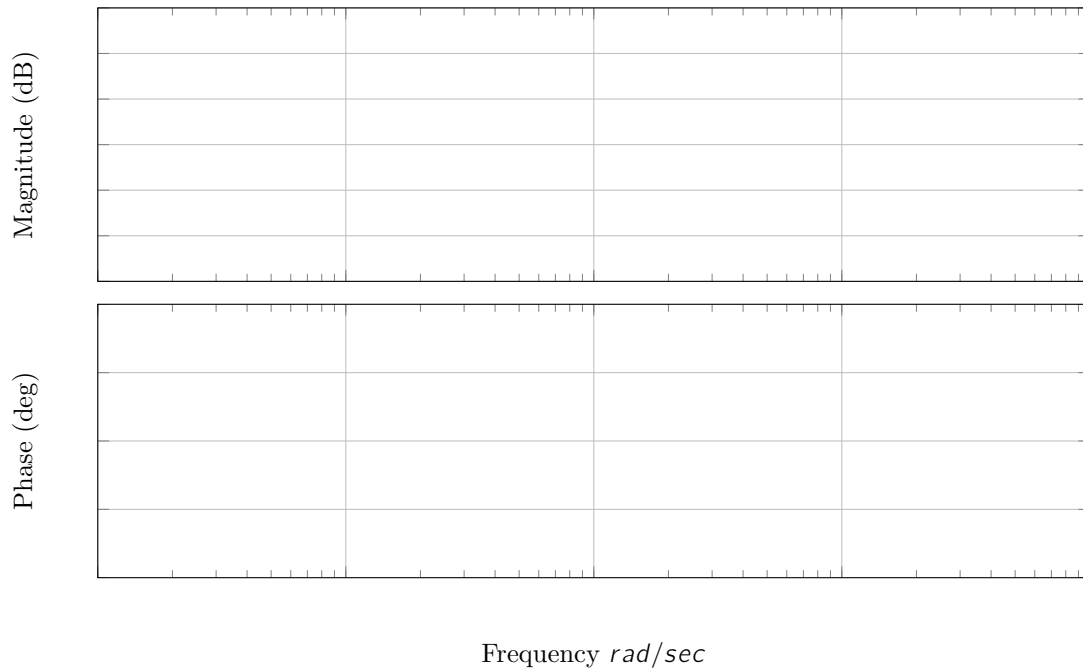
$$G(s) = \frac{10}{s(s/1.4 + 1)(s/3 + 1)}$$

design a lag compensator with unity DC gain so that $PM \geq 30^\circ$. What is the approximate bandwidth of this system?

Note: A lag compensator with unity DC gain takes the form

$$D(s) = \frac{T_I s + 1}{\alpha T_I s + 1}, \quad \alpha > 1$$

The DC gain here will be one, and the gain at high frequency will be $\frac{1}{\alpha}$.



Prob 2 |

$$G(s) = \frac{100000}{s(20 + s)(200 + s)}$$

Design a PID controller for $G(s)$ using loopshaping to satisfy the criteria

- Zero tracking for ramp inputs
- Phase margin of around 60°
- Minimum possible rise time

Hint: This is a minimum phase, stable system.

