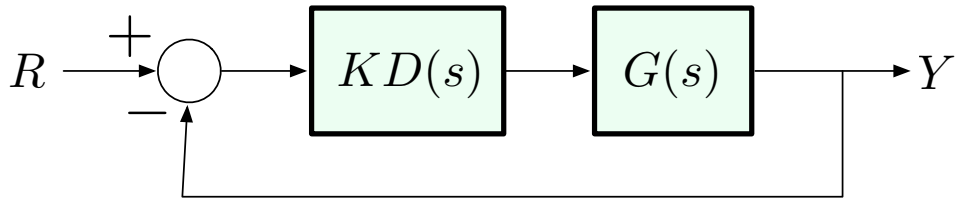
Example



$$\text{Let } G(s) = \frac{1}{s^2} \qquad \text{(double integrator)}$$

Objective: design a controller $KD(s)$ (K = scalar gain) to give

- stability
- good damping (will make this more precise in a bit)
- $\omega_{\text{BW}} \approx 0.5$ (always a closed-loop characteristic)

Strategy:

- from Bode's Gain-Phase Relationship, we want magnitude slope $= -1$ at $\omega_c \implies \text{PM} = 90^\circ \implies$ good damping;
- if $\text{PM} = 90^\circ$, then $\omega_c = \omega_{\text{BW}} \implies$ want $\omega_c \approx 0.5$