Second Order Systems Pole Plots and Step Responses

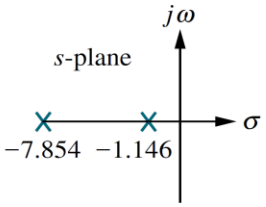
System	Pole-zero plot	Response

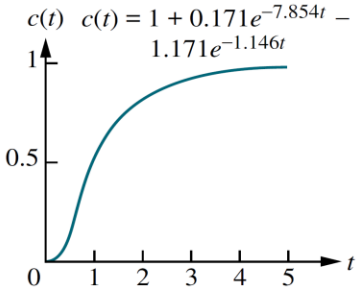
(a) $R(s)=\frac{1}{s}$ → $G(s)=\dfrac{b}{s^2+as+b}$ → $C(s)$

General

(b) $R(s)=\frac{1}{s}$ → $G(s)=\dfrac{9}{s^2+9s+9}$ → $C(s)$

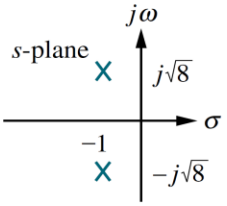
Overdamped

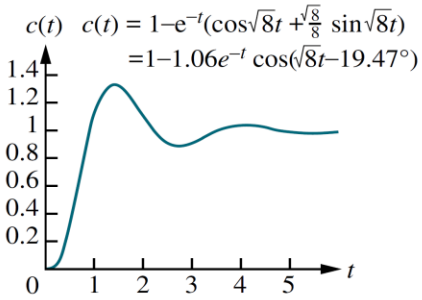




(c) $R(s)=\frac{1}{s}$ → $G(s)=\dfrac{9}{s^2+2s+9}$ → $C(s)$

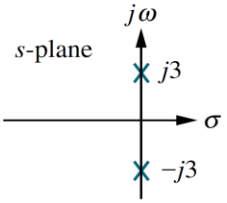
Underdamped

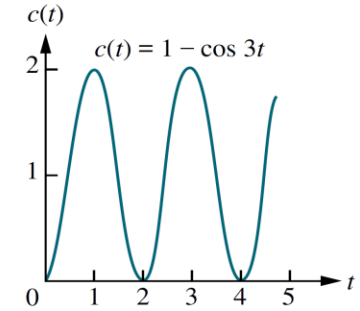




(d) $R(s)=\frac{1}{s}$ → $G(s)=\dfrac{9}{s^2+9}$ → $C(s)$

Undamped





(e) $R(s)=\frac{1}{s}$ → $G(s)=\dfrac{9}{s^2+6s+9}$ → $C(s)$

Critically damped