

Problem 4.(10pts) Consider the control system

$$\dot{x} = Ax + bu, \quad y = cx, \quad x \in \mathbb{R}^3, \quad u, y \in \mathbb{R}$$

where A is the matrix

$$A = \begin{pmatrix} -\lambda & 0 & 0 \\ 0 & -\rho & \sigma \\ 0 & -\sigma & -\rho \end{pmatrix}$$

where λ, ρ, σ are the constants you used in Problem 2, and where

$$b = \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, \quad c = (1 \ 0 \ 2)$$

Design a control law $u(t)$ so that the steady-state response $y_{ss}(t)$ satisfies

$$y_{ss}(t) = \sin(t)$$