

3F2 Systems and Control: 2010 Numerical answers

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12 May 2010

1. (b): $u = [10, 25, 25]^T$. (d): $x(t) = e^{-2t}\theta_0\nu$, where θ_0 is the initial temperature.
2. (b): $k_1 = 4$. (d)(ii): Steady-state error = $\frac{4}{5}r_0$ if r_0 is the amplitude of a step reference signal.
3. (b): $K = \left[\frac{a_{11}+2}{b_1}, \frac{a_{12}+1}{b_1} \right]$. (d): $K = [1, 3.5, -1]$.
4. (d)(ii): $W_o = \frac{1}{2\epsilon} \begin{bmatrix} 1 + \epsilon & 1 \\ 1 & 1 \end{bmatrix}$.