

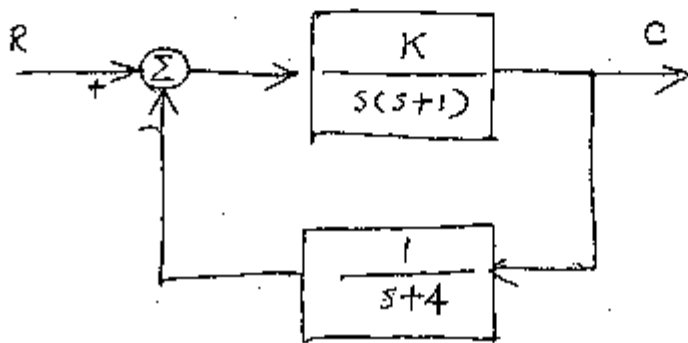
國立中央大學八十九學年度碩士班研究生入學試題卷

系別: 電機工程學系 丙組 科目: 控制系統 共 2 頁 第 / 頁

1. Compute $\begin{bmatrix} 1 & -1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}^k$ for any arbitrary integer k . (15%)

2. Try to explain why Bode plots should not be used with nonminimum phase transfer functions. (15%)

3. Find the gain K and the frequency ω at which the system given below becomes unstable. Consider only positive gains. (20%)

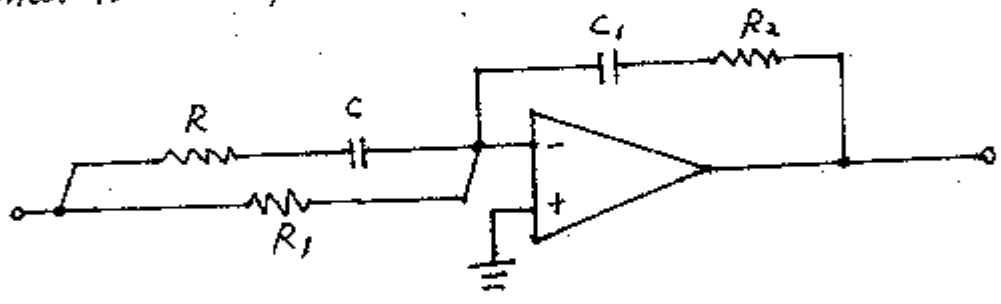


4. Find the gain margin and the phase margin of a unit feedback system with the forward path gain

$$\frac{200}{s^3 + 20s^2 + 100s}$$

5. (a) Plot the pole and zero placement of the following circuit. (Note: $R_2 C_1 > R_1 C + RC$.)

(b) What is the function of the circuit?



6. Design a full state feedback K so that the plant

$$\dot{x} = \begin{bmatrix} -3 & 1 \\ -2 & 0 \end{bmatrix} x + \begin{bmatrix} 1 \\ -2 \end{bmatrix} u$$

$$y = [1 \quad 0] x$$

has the closed-loop eigenvalues at $-2 \pm j2$.