

SECTION 7.8 #1, 2, 7

SECTION 7.9 #1, 4, 8, 11

IN ADDITION PLEASE DO THE TWO EXTRA PROBLEMS

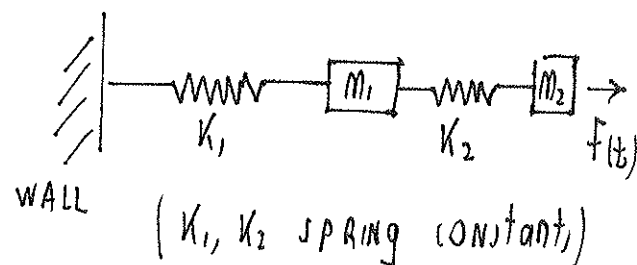
PROBLEM 1 CONSIDER THE LINEAR SYSTEM

$$\underline{x}' = \begin{pmatrix} \alpha & 1 \\ -2 & -3 \end{pmatrix} \underline{x} + \begin{pmatrix} 5 \\ 10 \end{pmatrix} \quad \text{WHERE } \alpha \text{ IS A PARAMETER.}$$

(i) FIND THE PARTICULAR SOLUTION \underline{x}_p . (ANSWER IS IN TERMS OF α)(ii) FIND THE RANGE OF THE PARAMETER α FOR WHICH $\underline{x}(t) \rightarrow \underline{x}_p$ AS $t \rightarrow \infty$ FOR ANY INITIAL CONDITION $\underline{x}(0)$.PROBLEM 2 CONSIDER THE COUPLED MASS SPRING SYSTEM MODELED

BY

$$\begin{cases} m_1 x'' = -k_1 x + k_2 (y - x) \\ m_2 y'' = -k_2 (y - x) + f(t) \end{cases}$$

(i) IF $m_1 = m_2 = 1$, $k_1 = 5$ AND $k_2 = 6$ AND $f(t) = 0$, FIND THE GENERAL SOLUTION TO (*)(ii) IF $f(t) = \sin(\omega t)$ FOR WHAT VALUES OF ω WILL RESONANCE OCCUR? (TAKE $\omega > 0$).(iii) FIND A PARTICULAR SOLUTION FOR (*) WHEN $f(t) = \sin(\omega t)$ IN THE FORM $\underline{x}(t) = \underline{\Gamma} \sin(\omega t)$ AND PLOT $|\underline{\Gamma}(\omega)|$ VERSUS ω . (HERE $|\cdot|$ MEANS THE LENGTH OF THE VECTOR)