大葉大學九十學年度研究所碩士班招生考試試題紙			
系 所 組 別	考 試 科 目 （中 文 名 稱）	考 試 日 期	備 註
電機所丁組	線性系統	4 月 22 日 第 二 節	

註：考生可否攜帶計算機或其他資料作答，請在備註欄註明（如未註明，一律不准攜帶）

一(20)Find the steady-state solution to the difference equation

$$8y_k - 6y_{k-1} + y_{k-2} = 5\sin(\frac{k\pi}{2})$$

二(20)Give the system

$$\dot{X}(t) = AX(t) + Bu(t) \qquad Y(t)=DX(t)$$

where

$$A=\begin{bmatrix} 0 & 1 \\ -1 & -3 \end{bmatrix} \quad B=\begin{bmatrix} 1 \\ 2 \end{bmatrix} \qquad D=[1 \quad 1]$$

(a) Determine the state controllability and observability of the system .

(b) Let u= - GX, where G=[g1 g2] . Determine if and how controllability and observability of the closed-loop system are affected by the elements of G.

三(20) Given the matrix A of a linear state equation.

(a) $A=\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$ (b) $A=\begin{bmatrix} -1 & 0 \\ 0 & -2 \end{bmatrix}$

Find the state transition matrix.

四(20) Consider the network shown in Fig. 1. (a) write down the dynamical equation that describes the systems. (b) Is the system stable ? (c) Is the system controllable ? observable ?

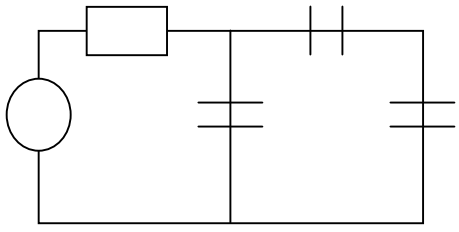

Fig. 1.

五(20) Define f(t) and g(t) as

$$f(t)=\begin{cases} e^{-t}, t \geq 0 \\ 0, t < 0 \end{cases} \qquad g(t)=\begin{cases} \alpha e^{-\alpha t}, t \geq 0 \\ 0, t < 0 \end{cases}$$

Find y(t)=f(t)*g(t)