ELECTRICAL ENGINEERING DEPARTMENT
EE 550-01   INTRODUCTION TO MODERN CONTROL
Second Semester 2001/2002
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HW
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0/03/2002
Due Date: 17/0 /2002

1. Which of the following sets of vectors are linearly independent?

   a. $\begin{bmatrix} 4 \\ -9 \\ 1 \end{bmatrix}$, $\begin{bmatrix} 2 \\ 13 \\ 10 \end{bmatrix}$, $\begin{bmatrix} 2 \\ -4 \\ 1 \end{bmatrix}$ in (R^3, R)

   b. e^{-t}, te^{-t}, e^{-2t} in (U, R), where U denotes the set of all piecewise continuous functions defined on $[0,)$.

   c. $3s^2+s-10$, $-2s+3$, $s-5$ in $(R_3[s], R)$

2. Compute e^{At} for

   $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

3. Compute $(t,0)$ for

   $A = \begin{bmatrix} t & 1 \\ 1 & t \end{bmatrix}$

4. Problem 4.2 of Text.

5. A discrete-time LTI system with matrix $A = \begin{bmatrix} 1 & 2 \\ 0 & a \end{bmatrix}$, with a 0, has zero input

   response $x = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ at k = 4.

   a)   What will the state be at time k = 7

   b)   What was the state at time k = 2.