

EE422G Homework #14 (12 points)

Due April 27, 2007

Please pick up your graded homework after 4/30 (Mon) outside FPAT 687.

1. (2 points) Linear Algebra

a. Find the determinant of $A = \begin{pmatrix} -1 & 0 & 0 \\ 1 & 3 & 0 \\ 0 & 1 & -4 \end{pmatrix}$

b. Find the inverse of A

2. (5 points) Identify the state matrices A, B, C, D AND the transfer function H(s) for the following set of equations

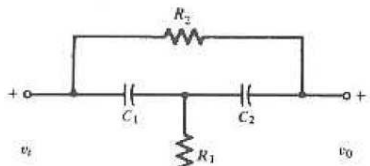
$$\dot{x}_1 = -4x_1 + 3x_2 + 6u$$

$$\dot{x}_2 = -x_1 - 7x_2 - 4u$$

$$y = 5x_1 - 3x_2 + 2u$$

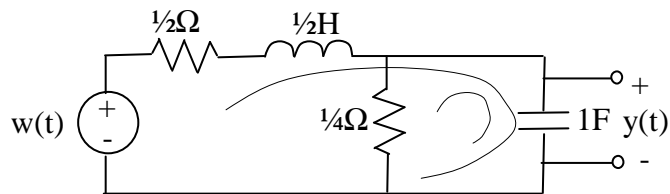
3. (2 points) Obtain a state model for the followings:

a. $H(s) = \frac{s+1}{s^2+s+3}$



b.

4. (3 points) Given the following circuit



- a. Define an appropriate state vector for the above circuit.
- b. Write the output equation in the form of $y = Cx + Dw$.
- c. Write the dynamics equation in the form of $\dot{x} = Ax + Bw$. Hint: Use KVL on the two loops indicated in the drawing.