**ECE130C** Home Work 7 Spring '09

Due 3 June 2009.

1. **Reading assignment**. Read sections 5.3, 5.4 and 5.5 of the text book. They will be part of your finals.

2. Do the following problems from the text book: 5.1.18, 5.1.34, 5.1.36, 5.2.10, 5.2.32, 5.2.40, 5.3.4, 5.4.40.

3. Find the general solution of the system of difference equations

$$y[n] = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} y[n-1] + \begin{pmatrix} u[n] \\ 0.5^n u[n] \end{pmatrix},$$

   where $u[n] = 0$ for $n < 0$ and $u[n] = 1$ for $0 \leq n$.

4. Find the solution of the above difference equation that satisfies the conditions $y[-1] = 0$.

5. Find the general solution of the system of differential equations

$$\frac{dy(t)}{dt} = \begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix} y(t) + \begin{pmatrix} u(t) \\ e^{-t/2} u(t) \end{pmatrix},$$

   where $u(t) = 0$ for $t < 0$ and $u(t) = 1$ for $0 \leq t$.

6. Find the solution of the above differential equation that satisfies the condition $y(0) = 0$.

*Hint*: In problems 3 and 6 you can de-couple the equations by diagonalizing the matrix $\begin{pmatrix} 1 & -1 \\ -1 & 1 \end{pmatrix}$.