Problem 1:

Write the matrix state equation for the circuit shown in the Figure.
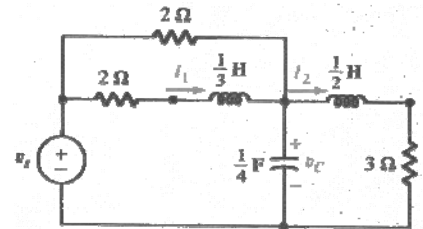
Problem 2:

For the zero state step response, use Euler's method to find $v_C(t=0.02s)$ for the circuit which has the following matrix state equation. Use $\Delta t=0.01s$.

$$\frac{d}{dt}\begin{bmatrix} i_L \\ v_C \end{bmatrix} = \begin{bmatrix} -1 & 2 \\ -3 & -4 \end{bmatrix}\begin{bmatrix} i_L \\ v_C \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \end{bmatrix}v_s$$
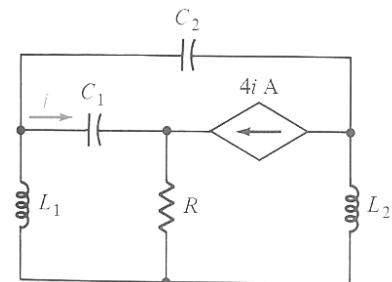
Hint: step response means $v_s = 1$ for $t \geq 0$

Problem 3:

Write the matrix state equation for the circuit in the Figure.
Let L_1=1/2 H , L_2=1 H, R= 5 Ohms, C_1= 1/5 F, C_2=1/10 F.
Draw a connected graph to represent the circuit then use the formal procedure attached for obtaining the state equations.

Mark every step clearly (No Credit will be given if the step number is not mentioned clearly)

Good Luck, **Dr. Ali Muqaibel**