Consider the RLRC circuit discussed in Problem 1 of HW1 and assume that $A, B, C, D$ of the state-space model is given in the following.

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}, \quad B = \begin{bmatrix} \frac{1}{L} \\ 0 \end{bmatrix}, \quad C = \begin{bmatrix} 0 & 1 \end{bmatrix}, \quad D = 0$$

where $a = -R_1/L, b = -1/L, c = 1/C, d = -1/CR_2$. Assume that we would like to use state feedback to move the poles or adjust the sensitivity of the system, but we cannot gain access to measure the state variables. (Perhaps the circuit is modeling something sealed inside a container.) Please design a stable estimator and use its state variables for feedback control. Assume that the estimator gain is $L = [l_1, l_2]^T$ and find the feasible range of the values of $l_1, l_2$, such that the estimator is stable.