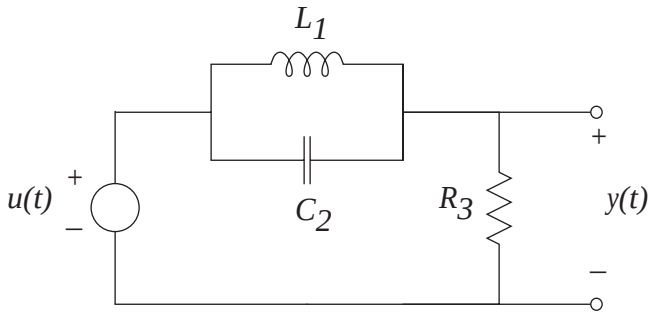
Problem S14 (Signals and Systems)

Consider the RLC circuit of Problem S13, shown below:



1. Find the transfer function, $G(s)$, of the system, using

$$G(s) = C(sI - A)^{-1}B + D \tag{1}$$

2. Find the transfer function using impedance methods. Show that your result agrees with the result in part (1).

3. For component values

$$L_1 = 1 \text{ H}, \quad C_2 = 0.25 \text{ F}, \quad R_3 = 10 \ \Omega$$

plot the magnitude of the transfer function $G(j\omega)$ vs. ω. Explain why the filter is called a notch filter.

Note: You may find it useful to use Matlab or a spreadsheet to calculate values of the transfer function, since there is a fair amount of complex arithmetic.