

ECE202 (Fall 2007)  
 HW # 7  
 Due: Friday, 10/19/2007

[100 pts]

(P. 1) [60 pts] For the circuit in Figure 1:

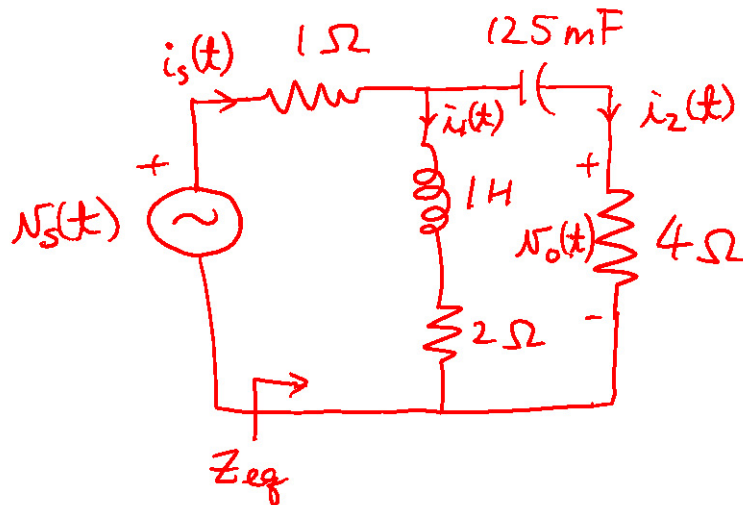


Figure 1 Circuit diagram for (P. 1)

- (a) [11 pts] Transform and redraw the circuit in the Laplace domain (label all variables clearly).
- (b) [10 pts] Determine the equivalent impedance,  $Z_{eq}$ .
- (c) [18 pts] Identify the poles and zeros of  $Z_{eq}$  before and after simplification/cancellation. Plot the poles and zeros in the complex plane (label all your axes).
- (d) [6 pts] What are the corner frequencies for  $Z_{eq}$ ?
- (e) [15 pts] Construct the Bode plots for  $Z_{eq}$ .

(P.2) [25 pts] For the circuit in Figure 1:

- (a) [5 pts] Determine the transfer function  $H(s) = V_o(s) / V_s(s)$ .
- (b) [6 pts] Identify the poles and zeros of the circuit from  $H(s)$  and plot them in the complex plane (label all your axes).
- (c) [2 pts] What is/are the critical frequency/frequencies?
- (d) [10 pts] Construct the Bode plots for the circuit.
- (e) [2 pts] What type of gain response is this?

(P.3) [15 pts] Show that a series LR circuit is a lowpass filter if the output is taken across the resistor. Derive an expression for the corner (cutoff) frequency,  $\omega_c$ . Calculate the corner frequency,  $f_c$ , if  $L = 2$  mH and  $R = 10$  k $\Omega$ .