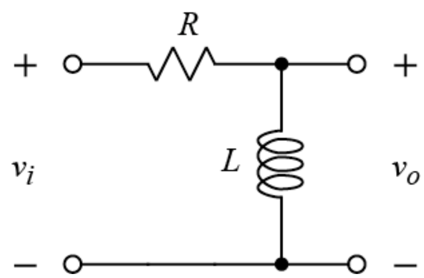
HOMEWORK #3

1.



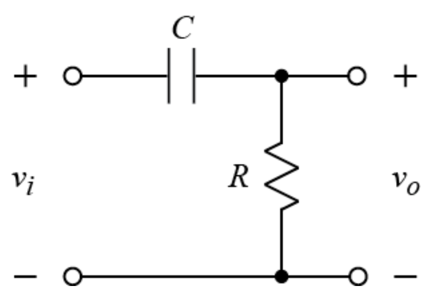
$R = 1\ k\Omega$ $L = 40\ \mu H$

a) Determine the transfer function V_o/V_i.

b) Plot $|V_o/V_i|$ versus ω.

c) Find the cutoff frequency, ω_c.

2.



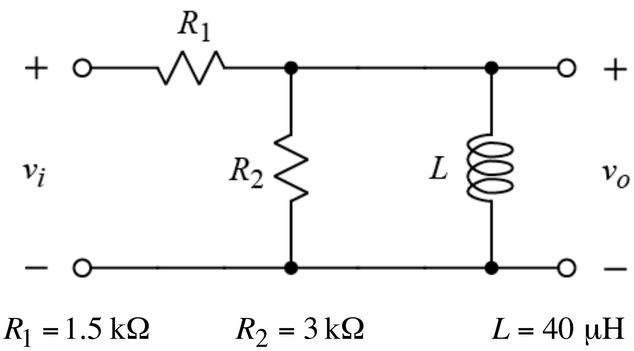
$R = 1\ k\Omega$ $C = 40\ pF$

a) Determine the transfer function V_o/V_i.

b) Plot $|V_o/V_i|$ versus ω.

c) Find the cutoff frequency, ω_c.

3.

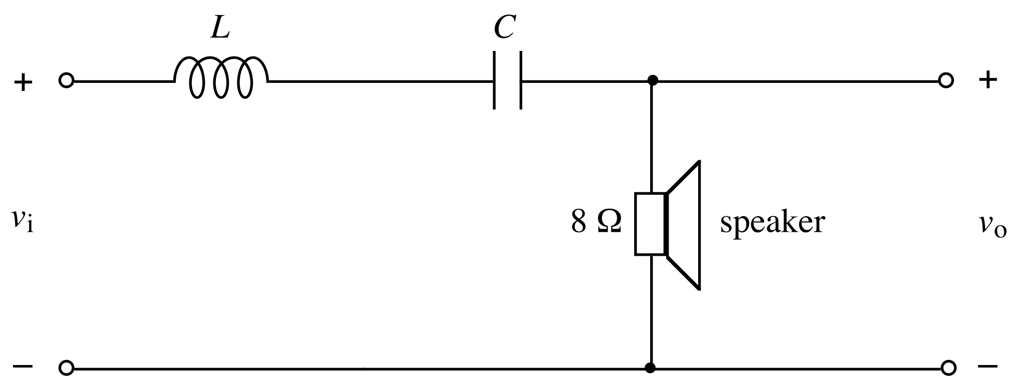


a) Determine the transfer function V_o/V_i. **Hint:** use a Thevenin equivalent on the left side.

b) Plot $|V_o/V_i|$ versus ω.

c) Find the cutoff frequency, ω_c.

4.

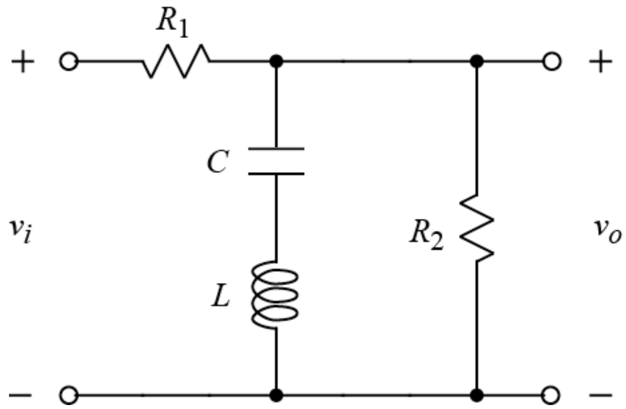


The above circuit is part of a simple crossover network for driving a midrange speaker having an impedance of 8Ω. The circuit is described at the following web site: http://www.termpro.com/articles/xover2.html. A more in-depth discussion of crossover networks may be found at http://sound.westhost.com/lr-passive.htm.

a) The web site describing the above bandpass filter suggests using cutoff frequencies of f_{C1} = 130 Hz and f_{C2} = 4 kHz. Determine the L and C values that yield these cutoff frequencies.

b) Plot $|V_o/V_i|$ versus ω.

5.



$R_1 = 18\ \Omega$ $R_2 = 36\ \Omega$ $C = 31.25\ \mu F$ $L = 2$ mH

a) For the band-reject filter shown above, determine the transfer function V_o/V_i. **Hint:** move R_2 to the left of L and C, and use a Thevenin equivalent.

b) Find ω_o

c) Find ω_{C1} and ω_{C2}

d) Find β and Q