Practice Problems

1. Calculate the cutoff frequency for a circuit with:
    a. R = 1kΩ and C = 3nF

    b. R = 5kΩ and C = 1.5µF

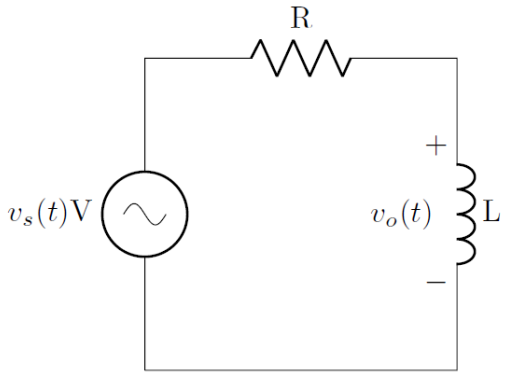
2. What should the resistor value be for the following filters:
    a. f_{cutoff} = 1.5kHz and C = 500 nF

    b. f_{cutoff} = 417Hz and C = 56nF

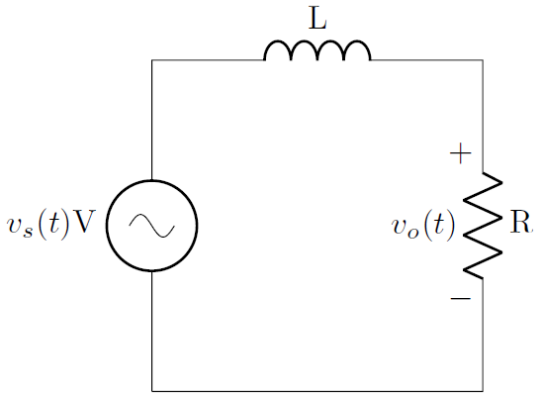
    c. f_{cutoff} = 2kHz and C = 500 µF

3. Are the circuits below high or low pass filters? How do you know?

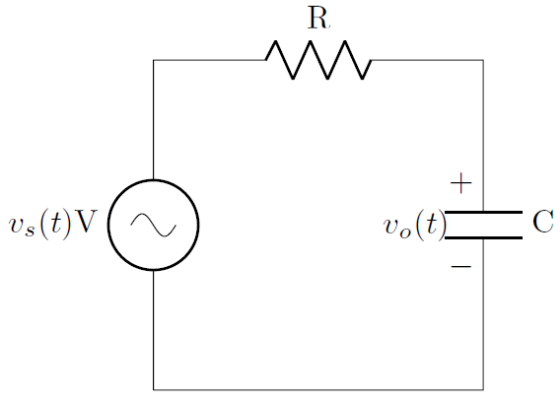
(a)



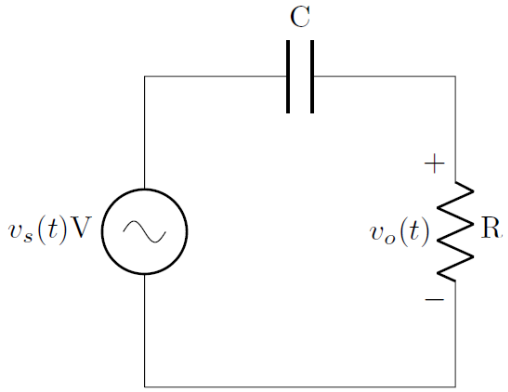
(b)



(c)



(d)



4. Calculate the cutoff frequency of the following systems.

(a) A transmission line modeled as an R-L circuit with R=4 Ω and L=5μH.

(b) An R-C low pass filter with R=60 Ω and C=5nF

(c) A C-R high pass filter with R=100 Ω and C=8μF.

5. Your communications radio has a lower frequency bound of 800kHz. You know it has a capacitor value of 100nF, but what is the resistor value?

6. Design a high pass filter to get rid of a DC bias (0Hz) using a 100-Ω resistor you have available.

7. For the circuit below, what is the magnitude of the gain, $\left|\frac{v_o}{v_{in}}\right|$, at 60 Hz?