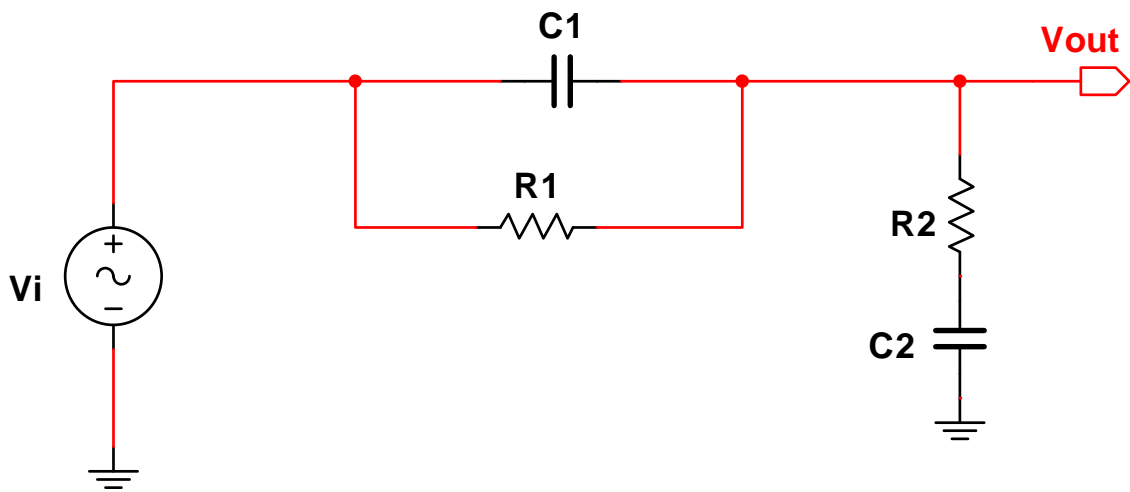# ECE 3043 Spring 2020
Homework Problem Set No 1 for Experiment No. 2

Due Week of January 20

1. For the circuit shown above derive the complex transfer function $H(s) = V_o/V_i$. Express it as a function of the symbols for the resistors and capacitor and the complex frequency variable s. Simplify it as a ratio of two first order polynomials in s

$$H(s) = K\frac{1 + s\tau_z}{1 + s\tau_p} \tag{1}$$

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2. Plot the Bode plot for the circuit using either Mathcad or Matlab. Plot the frequency from $f = 1\,\text{Hz}$ to $1\,\text{MHz}$ Plot the magnitude in dB and the phase in degrees. The values of the circuit components are $R_1 = 100\,\text{k}\Omega$, $R_2 = 1\,\text{k}\Omega$, $C_1 = 1\,\text{nF}$, and $C_2 = 0.1\,\mu\text{F}$.Make the same plot as in Problem 2 using National Instruments SPICE (Multisim).

3. Make the same plot as in Problem 2 using National Instruments SPICE (Multisim).

4. Does anything unusal happen in the frequency response plot occur when $f = 1/(2\pi\sqrt{R_1 R_2 C_1 C_2})$? If so describe it.